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ABSTRACT

This report describes the naturally occurring variations in time allocated to reading instruction in eight grade-five classes selected as part of the Beginning Teacher Evaluation Study. Students completed a set of reading tests in early and late fall and teachers maintained records of instructional time allocated, setting, and content covered. Ceiling effects in the reading tests precluded an analysis of the relationship of time to achievement. The time data were analyzed to identify variations across classes and differences between students within a class in terms of time allocated to instructional settings and content areas. It was found that opportunity to learn varied greatly from one class to another and from student to student within any given class. Mean teacher ratings of student engagement compared reasonably well with independently observed class averages of engagement. (Author/AA)

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BTES

Beginning Teacher Evaluation Study Technical Report Series

Technical Report II-5

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CS003 758

PREFACE

The Far West Laboratory conducts research for the California Commission for Teacher Preparation and Licensing through funds provided by the National Institute of Education. The Commission has responsibility for certifying teachers and teacher training programs in the State of California. The research that the Commission sponsors is designed to help them understand what teacher behaviors or instructional activities are beneficial for students. With a reliable knowledge base in this area the Commission and the institutions that train teachers would be better able to provide training experiences based on empirical findings relating teacher behavior to student achievement.

In previous years under the Commission's sponsorship, the Beginning Teacher Evaluation Study (BTES) has conducted empirical and methodological research on teaching which led to a belief that an important element in the study of teaching and learning is instructional time. Time allocated by teachers for learning specific academic subject matter showed considerable variation across classes, and also varied among students within these classes. Further, students appeared to be quite variable in how engaged they were in their assigned academic activities. These major variations in the amount of time students spent learning in different classes called for further investigation. During the continuation of Phase III-A for the Commission's research effort (1975-76) the Laboratory staff was granted permission to explore some of these temporal factors in instruction.

The data collected as part of this research activity encompassed one school year of instruction in reading and mathematics at grades 2 and 5. A number of approaches (reported in other BTES documents) to understanding the relationships among time allocation patterns and student learning have been attempted. Part of the work in this area was carried out under sub-contract

to the ML-Group for Policy Studies in Education, CEMREL, Inc. After collection of the data and initial processing by staff of the Far West Laboratory, computer tapes containing the data collected on instruction in grade 5 reading were transmitted to the ML-Group. This report is based largely on an analysis of these data by Annegret Harnischfeger, Raymond E. Pifer, Norma J. Sutton, and David E. Wiley.

Charles Fisher, Richard Marliave, Nikola Filby, and Leonard Cahen of the BTES staff designed the instruments and supervised the data collection in this area of the study. Jeffrey Moore, Pat Storm, and Mark Phillips of the BTES staff carried out the initial stages of the data processing effort. Marilyn Dishaw, Faye Mueller, and Fannie Walton coordinated many of the field activities and technical services so necessary for a field study that required the collection and processing of large quantities of data from natural classroom settings. Their efforts, and the efforts of the many field workers who assisted with the data collection are greatly appreciated.

Jeremy George typed the final copy and Edna Rohnett provided valuable clerical support. We thank them for their help.

Our thanks and appreciation go to the teachers and students in California schools who continue to support this project by donating their time and comments. The hard work of many teachers, in addition to their regular classroom responsibilities, makes this research possible. To each of these dedicated volunteers we owe a special thanks.

David C. Berliner
Principal Investigator
Beginning Teacher Evaluation Study
December, 1976

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I. INTRODUCTION

The primary goal of the Beginning Teacher Evaluation Study is to investigate relationships between various aspects of instructional strategies and student achievement. Instructional strategies[1] refer to the choice of curriculum content areas and setting variables. When implemented, these choices result in students spending time on specific content areas in specific settings (e.g., small group seatwork on "synonyms" with a teacher directly involved). The organization of such pupil activities over a period of time constitutes the in-school instruction for that student. The instruction for students in the same class differs to the extent that the chain-of-activities for individual students varies. Presumably the homogenity of these chains-of-activities differs from one class to another. How much does instruction differ from one class to another and from one student to another in the same class? The examination of time allocation patterns can answer this question. The description of patterns of time allocation to subcategories of subject matter and classroom setting both within and across classes is a major goal of the work reported in this document.

Differences in time allocation patterns are potentially related to differences in student achievement. Within certain ranges, it is reasonable to expect that more time allocated to a content area will result in more achievement in that area. This relationship may be relatively strong or weak depending upon a variety of other conditions (specific teacher instructional behaviors, curriculum materials characteristics, etc.). The second major goal of this work segment is to examine the relationship between patterns of time allocation and changes in student achievement.

During the continuation of Phase III-A of the Beginning Teacher Evaluation Study (Far West Laboratory, 1975), data were collected in four separate

samples of approximately eight classes each. Data on reading instruction at grade 2 and mathematics instruction at grade 2 came from two of the samples. The other two samples yielded data on reading and mathematics instruction at grade 5. This report[2] deals exclusively with the data collected on reading instruction in the grade 5 sample.

In keeping with the goals of Phase III-A, an important function of this exploratory study was to provide experience in collected and analyzing data on instructional time. The information on time allocation and the utility of various data collection devices is intended to facilitate the design and conduct of Phase III-B of the Beginning Teacher Evaluation Study.

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[1] For an analysis of teaching-learning processes in elementary school classrooms see Harnischfeger and Wiley (1975a, b).

[2] For other reports on analyses on time allocation and student achievement conducted as part of Phase III-A of the Beginning Teacher Evaluation Study see Filby and Dishaw (1976) and Fisher (1976a, b).

II. DESIGN AND INSTRUMENTATION

Design

The objectives of this study were to describe the naturally occurring variations in time allocated in reading instruction in a sample of grade 5 classes, and to relate these variations to variations in student achievement. No manipulation of classroom conditions or teacher behaviors was attempted. The strategy was simply to assess student achievement in a number of content areas on two occasions; once early in the fall and once late in the fall. In the intertest interval, records of allocated time were kept. The intertest period was chosen in such a way that a maximum interval (about 40 days of instruction) was available without inconvenience to schools during the first two weeks of classes or the week preceding Christmas vacation. It was also necessary to have approximately ten days at the beginning of the school year for contacting teachers and instructing them in procedures for keeping records of allocated time. These practical time constraints determined that the first testing occasion (referred to as occasion A) take place during the first week of October, 1975. Records of allocated time were kept for eight weeks of instruction, after which the second testing (occasion B) was conducted during the first week of December, 1975.

Measures of Reading Achievement

The measures of reading achievement used in this study are a subset of the reading scales being developed by the staff of the Beginning Teacher Evaluation Study. Interim versions of scales[1] being refined for Phase III-B were used.

A large battery of reading items were administered at occasions A and B. The battery contained 284 items grouped into approximately three dozen subscales each assessing achievement in a specific reading content area

commonly taught at grade 5 in California schools. With the exception of a small number of items (for example, word division in the compound words subscale), all items were of the multiple choice type. All items were group-administered. Scores were corrected for guessing using the standard correction procedure (Thorndike, 1971). Although some tests were short, the internal consistencies were relatively high. Identical items were administered at occasions A and B and the resultant scores were used in conjunction with time measures assessed over the intervening eight week interval.

Process Variables

The process data consisted of measures of allocated time spent in particular reading content areas. In addition to content areas, several instructional settings were distinguished. Allocated time was assessed by a log-keeping procedure. This section of the report describes the subject-matter and setting categories and the teacher log procedure. The final protion of this section describes procedures used in deriving an index of student engagement.

Subject-matter and instructional setting categories. Since instruction is planned and implemented by content area, and since student achievement is most often differentiated by content area, instructional time was first partitioned by content category. Subareas of reading (e.g., decoding, word meaning, comprehending main ideas) constitute the categories. Reading content categories were developed at two levels; general and specific. They were derived from a logical analysis of reading objectives, textbooks, and curriculum materials. The original categories were modified and refined by classroom teachers during piloting.

For grade 5 reading, 68 specific content categories[2] were defined. (All content categories are listed in Appendix A, Table A.3). Specific

content categories were developed so that allocated time could be recorded in relatively narrow categories.

In addition to the content categories, broad instructional settings were defined by three fundamental instructional characteristics: adult involvement, pacing, and group size.

The teacher-involvement facet had two elements. Settings in which students worked directly with a teacher (or other adult) were distinguished from settings in which a teacher's primary attention was not directed toward the students being considered. This facet is important because the impact of a teacher's interactive behaviors and skills operates in the former but not the latter type of setting. (The term "teacher" was used in the broad sense, to include any adult directly involved in instruction.) If a class was divided into two groups at some point in time, and one of the groups was engaged in word drill with the teacher while the other group was doing seatwork, the students in the drill activity were in a setting with direct teacher involvement. The students who were doing seatwork were in a setting which did not involve a teacher directly, even though the teacher may have occasionally addressed one or more of them. If students were engaged in seatwork, and the teacher's main activity consisted of going from student to student to check or explain work, the teacher was characterized as directly involved, even though he did not interact with all students in the group.

The pacing facet was included to distinguish between settings in which students proceeded at their own pace and settings in which they worked at a pace determined by the teacher (or some other characteristic of instruction). Pacing is very much a matter of degree; students never completely determine their own pace, nor is pace totally determined by external factors. Nevertheless, instructional settings vary considerably in this respect; and, as a result, the rate of student learning may be strongly affected. As a crude operationalization of

pacing, a distinction was made between seatwork and group work. Seatwork is the most frequently occurring setting in which students have relatively high control over pace; group work is the situation which is most externally paced.

The third facet of instructional setting was group size. This facet has been the subject of much research and has great intuitive appeal. It was included here, not because of its potential direct effect on learning, but because different group sizes provide the opportunity for very different kinds of student activities, teacher behaviors, and group climates. The mere fact that a student is working in a small group does not imply that a particular kind of instruction will occur; it does act as a necessary (but not sufficient) condition for certain highly-valued teacher behaviors. For instance, the smaller the group, the more closely a teacher can approximate a tutoring situation with each student. However, a lecture to a group of five children is probably very much like a lecture to a group of 35 children. Group size, like the facets of setting, was coded as a dichotomy. Large groups were defined to contain 10 or more students; small groups, nine or fewer. Pilot experience showed that a lower value for the upper bound of "small groups" would have provided very little discrimination among actual classroom groups.

Teacher logs. The teacher logs were developed by the staff of the Beginning Teacher Evaluation Study. The logs served as the primary source for collecting data on allocated time. The development of practical methods for collecting information on allocated time was, in itself, an important objective of the work carried out during the continuation year of Phase III-A of the Beginning Teacher Evaluation Study.

All participating teachers maintained records of time allocated to reading instruction. These were referred to as "teacher logs." The logs provided information on content covered and settings for reading instruction, on a daily basis, for groups of students in each class. The time allocated to each

instructional setting was recorded, with one or more content categories associated with that setting. In highly individualized classes, teachers recorded the content covered and settings used for each student during reading instruction.

The teacher log format is presented in Figure 1. Each one-page log covered one week of instruction for a single group of students. The names of the students in a given group were designated on the attendance/group composition sheet (shown in Figure 2). Each teacher listed his class roster on the left hand side of the attendance/group composition form. For a given week, the teachers then designated the reading instruction group for each student and the daily attendance. This allowed for changes in the composition of student groups from day to day or from week to week.

Reading content was recorded according to the list of categories in Appendix A. Teachers referred to the list to find codes for content categories that best described the instruction. Teachers were also provided with glossaries which contained examples of each of the content categories, and were individually trained in the log keeping procedure. Practice logs were kept by each teachers for up to two weeks before data collection began. The training and glossary were intended to ensure reliable categorization of content from teacher to teacher.

In classroom situations, content tended to change more quickly than setting. For this reason, several content categories were often designated for one instructional setting. The starting and ending time for each setting was recorded, thereby providing a record of the instructional time allocated to the content covered in each setting. If several different content categories were recorded for one setting, (and hence one time period), the teacher specified the time devoted to each content category whenever possible. Otherwise, the total time for the setting was distributed equally among the

TEACHER _____ GRADE _____ READING _____ MATH _____ GROUP _____ WEEK _____

TIME:

MONDAY	CONTENT	
	Adult / No Adult and Seatwork / Other	
	MATERIAL	
TUESDAY	CONTENT	
	Adult / No Adult and Seatwork / Other	
	MATERIAL	
WEDNESDAY	CONTENT	
	Adult / No Adult and Seatwork / Other	
	MATERIAL	
THURSDAY	CONTENT	
	Adult / No Adult and Seatwork / Other	
	MATERIAL	
FRIDAY	CONTENT	
	Adult / No Adult and Seatwork / Other	
	MATERIAL	

Figure 1
Teacher Log Format

Figure 2

Attendance/Group Composition Record

READING MATH (circle one) Teacher_____ Grade_____

Week of_____

Student's Name	Group	M	T	W	Th	F
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						
16.						
17.						
18.						
19.						
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22.						
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25.						
26.						
27.						
28.						
29.						
30.						
31.						
32.						
33.						
34.						
35.						

content categories, yielding an estimated time allocated to each category.

The defining characteristics of instructional settings (adult involvement, pacing, and group size) have been described above. Direct involvement of an adult covered a range of activities from lecturing to monitoring independent seatwork. "Adult" referred to any teacher, student teacher, or aide. The same adult was not classified as directly involved in more than one setting at a time. Therefore, an adult would not be classified as directly involved in monitoring seatwork if that were a secondary function of the adult.

Regarding the pacing facet: "seatwork" referred to any setting where students worked independently. Two or more students working together, or an adult tutoring one student, was classified as a group-work setting.

The group size facet was not recorded by teachers. This categorization was made by coders when the teacher logs were returned to the Laboratory for processing. Group size was ascertained by checking the number of students in a particular group on the attendance/group composition form.

In addition to the information noted above, teachers provided a brief description of the materials used in each instructional setting: the name of a textbook and the pages covered, worksheets used for seatwork assignments, and the like.

In summary: for a given week, each teacher recorded how students were grouped for reading instruction on the attendance/group composition form. Daily absence records were kept on the same form; and if group composition changed during the week, the changes were also reported. On the teacher log form itself, teachers kept daily records for each student group. For each day, time periods were blocked off by vertical lines (drawn by the teacher). The beginning and ending times for a setting were recorded along the top of the form. For each setting, teachers recorded adult involvement, pacing, materials, and content categories. In this way, varied instructional patterns could be recorded

on the same form.

Where teachers grouped students for instruction, this procedure worked well. Where instruction was highly individualized, variations were adopted. This most often required the keeping of records for individual students; or, where teachers operated a number of "activity stations," records could be kept for each station.

Since the log procedures were quite new, relatively little was known before the study about their measurement characteristics. Therefore, in order to obtain independent assessments of allocated time, additional data were collected. Far West Laboratory coders, who transferred the raw teacher logs into machine-punchable formats, spent one day in each classroom. During that day, the coders completed a log for the reading instruction that occurred. This log was then available for comparison with the teacher log for the same day. Since there was only one day of coder log per teacher, these data were treated in a clinical manner.

Student engagement. The time allocated to a content-setting combination represents an upper limit for the time a student may work during school on that area. However, students do not necessarily spend all of the time working at the intended task or activity. As a result, the time allocated to a content-setting combination may be thought of as partly engaged time and partly unengaged time. The amount of engaged time spent in a particular content-setting combination varies from student to student. Since these differences are of interest in themselves and since engaged time is theoretically related to student outcomes, an assessment of engaged time was attempted.

The procedure was based on adjusted teacher ratings of student attentiveness. Teachers were asked to rate each student in terms of the percent of the time which the student paid attention during class. These ratings were made twice: once for instructional settings where an adult was directly involved,

and once for settings where no adult was directly involved. The percent attentiveness ratings were made by placing a check in one of nine categories, where each category represented an increment of 10 percent on a zero percent to 100 percent scale. The directions to teachers and the two rating forms are included in Appendix A. (By an oversight, the category representing 31 to 40 percent was omitted from the form.)

The teacher ratings of attentiveness were assigned the mid-category value; that is, a check in the 81-90 percent category was assigned a value of 0.85. This provided a distribution of attentiveness scores for each class. However, comparison from one class to another would be hazardous, since errors due to teachers' tendencies to rate high or low would appear as between-class differences. In an attempt to correct for possible teacher bias, class estimates of mean engagement were made.

The estimates were based on data collected during instruction in reading. An observer visited each class for one day. During the reading instruction periods, the observer counted the number of students engaged and the total number of students nominally working on reading. This procedure was repeated every four minutes. In this manner, average class engagement estimates were calculated (see Table A.2, Appendix A).

Sample and File Characteristics

The field work carried out by Far West Laboratory during the continuation year of Phase III-A of the Beginning Teacher Evaluation Study (see Far West Laboratory, 1975) involved a sample of 33 teachers. This sample was composed of 16 grade 5 and 17 grade 2 teachers. Each volunteered to participate in the one-year study.

The teachers were recruited in the San Francisco Bay Area by Far West

Laboratory staff during the spring of 1975. After meetings with administrative officials and bulding principals in ten districts, individual teachers were contacted. The study was described, and teachers were offered extension credits (through a cooperating college) or an honorarium for their participation.

In September of 1975, it was decided to conduct the reading and mathematics studies with separate samples of teachers. The teachers at both grade levels chose to participate in either the reading or the mathematics sample.

Teachers in this study completed a remarkable amount of work in connection with the study. (The work reported here is based on data collected over approximately 10 weeks of instruction during the fall of 1975; the teachers continued to contribute to other facets of the Beginning Teacher Evaluation Study through the spring of 1976.) Each teacher received either a $50 honorarium or four extension credits for participating in the study. They were paid $10 per week for the completion of teacher logs (kept over a period of approximately 12 weeks).

The sample included one male teacher, the remainder were female; all had several years experience in teaching. Several of the classes were split grades, containing some grade 4 (or grade 6) students and some grade 5 students. Only grade 5 students (but no necessarily all grade 5 students in a given class) were included in the study. Of the grade 5 students in a class, teachers were asked to identify those who were reading at a level below grade 4. Since the low reading level would have made it difficult to test these students reliably, they were not tested, nor were they followed via the log procedure. At the initial testing, it became clear that several other students were not able to complete the tests. These students were also dropped from the study. Students who were tested but for whom the tests were too difficult were designated "not followed" in the initial data matricies. Those for whom

test data and log data were collected were designated "followed." Midway through the study one class was dropped because the log data were not returned regularly.

Thus, the useable sample consisted of eight fifth grade classes from seven elementary schools. The major portion of the data was stored on tape in four district files:

File A - the first data file, contained aggregate time allocation information on 145 children. The aggregate data were in the form of 68 (content areas) x 8 (instructional settings) matrices, one matrix for every child.

File B - the second data file, contained pre- and posttest scores on 216 children. Results of 35 distinct reading subtests were included, together with five summary scales.

File C - the third data file, contained teacher rating information on pupil engagement for 146 children. Two ratings were assigned to each child; one for an "adult present" instructional setting, the other for a "no adult present" setting.

File D - This file was created by merging files A, B, and C. The merged file consisted of 118 students who were able to pass four selection criteria that were applied in a sequential fashion. The criteria and the number of students who failed them are: a student who is represented in one file should be represented in the other two files (71 failures); each student's status at the "A" and "B" testing occasions should be "followed" (4 failures); a student should have complete data on all pre- and post-subtests (21 failures); and a student should have been assigned both an "adult

present" and "no adult present" engagement rating by his teacher (2 failures). Using this procedure a total of 98 children were not accepted for the merger. The students in Files A and C constitute proper subsets of File B.

Some analyses were performed on each of Files A, B, and C, other analyses were performed on File D. Table 1 describes the sizes of these files.

We had set out to examine the relation of teaching strategies and curricular choices to achievement. The data on reading instruction from eight fifth grade classes (cclected over a 40 day period, with pre- and posttesting) made up our working material. After initial analyses, we realized that it would not be completely appropriate to trace pupils' classroom activities to their achievement in this data set. The reason: the value of the reading achievement scales was severely diminished by a "ceiling effect." Out of eight classes, four were already achieving at a very high level at the time of pre-testing. Therefore, these students could not show large gains. As a consequence, the measurement of gain in reading achievement was, in many cases, of very limited use. No valid inferences could be drawn relating achievement and classroom instruction without considerable additional resources and extensive analyses of test item data.

Analyses were restricted to the extraction and formulation of teaching/learning characterizations potentially related to achievement, and thus to teacher performance and resource allocation. Since we believe this to be an important approach to understanding classroom data, most of the work is purely descriptive. The small sample size (eight classes) encouraged this approach, which is typically employed only in case studies. However, in some instances, it was possible to perform relational analyses between time and achievement.

As a guide for future data collection and analysis, we present in this report, a number of new and interesting characterizations of classroom

Table 1

Summary of Data Files

			Membership Frequencies			
School	Class	Teacher	File A	File B	File C	File D
1	1	1	25	27	25	22
2	2	2	19	28	19	17
3	3	3	10	10	10	9
3	4	4	18	18	18	16
4	5	5	16	18	16	16
9	6	10	22	34	22	15
11	7	12	19	33	20	9
12[1]	7a	14	0	30	0	0
13	8	15	16	18	16	14
Totals			145	216	146	118

1 This row represents a class for which there were test data, but not log data. The class was dropped from further consideration in this report.

processes. Each of these is exploratory in nature and is intended to indicate potentially useful perspectives on time allocation data.

---

[1] The history of development and data from pilot testing of the items are included in Technical Report III-1: Development and Re inement of Reading and Mathematics Tests for the Study of Reading and Mathematics Instruction in Grades 2 and 5 (Filby & Dishaw, 1975). For a description of further refinement of the tests through an analysis of reactivity using the current data set, see Filby and Dishaw (1976).

[2] The content category system had a primary use related to the study of test reactivity (Filby & Dishaw, 1976). For this purpose the categories were designed to encompass the entire grade 5 curriculum.

III. RESULTS

Classroom Characteristics

Classes were characterized in ways that neither exhaust nor always adequately mirror the set of teaching/learning process constructs we feel to be important. The first set of characteristics (Table 2) shows reading achievement levels at the inception of this investigation. "Class size" is an institutional factor; the other columns in the table describe typical individual pupils.

We view the first of these, "mean composite score on the pre-test," as possessing the greatest descriptive value. It reflects initial achievement. The corresponding posttest score (Table 7) was intended to allow assessment of intervening learnings. However, ceiling effects decreased the value of this variable. As test scores approach their maximum, increases in actual achievement result in increasingly smaller measured increments. This effect is signaled by large drops in the standard deviations of the posttest score distribtuions. When small score variability accompanies high mean scores in a class, one can be fairly certain that ceiling effects are present. Here (in Tables 2 and 7), these effects are exhibited most strongly by classes 3 and 4, and to a lesser degree by classes 1 and 2.

The characteristics shown in Table 3 relate to the instructional strategies used by teachers. All variables included in the table reflect teachers' grouping and content-selection patterns. The first two, "number of content-setting combinations used" and "variety in coverage," indicate teacher choices about the presentation of content and organization of instruction. "Number of content x setting areas taught to all pupils" and "commonality in coverage," show the extent to which a teacher's content-setting combinations were used with all "followed" children in the class.

Table 2

Initial Reading Characteristics of Classes

Class	Class Size[6]	Mean Composite Score on Pre-Test[1]	Standard Deviation of Composite Score on Pre-test[1]	Mean Composite Score on Pre-test as a Percent of Maximum Score[1,2]
1	26	200.94	41.43	70.75
2	28	201.86	49.39	71.08
3	27[3]	238.36	12.53	83.93
4	31[4]	249.85	11.16	87.98
5	21[5]	134.41	61.92	47.33
6	33	67.60	44.51	23.80
7	34	116.45	66.98	41.00
8	28	163.82	60.69	57.68

[1] Results are based on data file D.

[2] Maximum possible score is 284.

[3] Only 11 students in this class participated in the study.

[4] There were 13 fourth and 18 fifth graders in this class. All of the fifth graders were followed in the study.

[5] Twenty students in this class participated in the study.

[6] These class sizes were recorded during the first week of school. In some cases (e.g., Classes 1 and 6), additional pupils were enrolled before testing began (see Table 1).

Table 3

Reading Instructional Coverage Style

Class	Number of Content x Setting Areas Used[1]			Variety in Coverage: Number of Reading Content x Setting Areas Used as a Percent of Total Possibly Used[1,2]			Number of Content x Setting Areas Taught to all Pupils[1]	Commonality in Coverage: Number of Content x Setting Areas Taught to All Pupils as a Percent of Number of Content x Setting Areas Taught to Some Pupils[1]
	C x S	Content	Setting	C x S	Content	Setting		
1	67	33	4	12.32	48.53	50.00	50	74.63
2	104	41	6	19.12	60.29	75.00	7	6.73
3	143	55	4	26.29	80.88	50.00	115	80.42
4	105	45	4	19.30	66.18	50.00	98	93.33
5	116	54	7	21.32	79.41	87.50	48	41.38
6	94	40	8	17.28	58.82	100.00	26	27.66
7	105	44	6	19.30	64.71	75.00	11	10.48
8	88	44	6	16.18	64.71	75.00	24	27.27

[1] Results are based on data file A.

[2] Maximum possible value of Content x Setting Areas is 544.

While it may be reasonable to expect that high values for these variables indicate instruction of the whole-group type, this is not logically necessary; a teacher with preferences for small group and tutorial settings could individually direct all or most of her students to a common selection of content setting combinations. We will discuss this issue more fully below.

Different rates of student absenteeism contribute to differences in the degree of implementation of teacher preferences about content-setting combinations. Therefore, the data presented in Table 3 must not be taken as "pure" indicators of strategy; rather, they reflect actual teaching.

Table 4 presents data about resource allocations that determine the quantity of schooling received by pupils. The first two characteristics, "maximal exposure to instruction"[1] and "average teacher aide assistance" are related to institutional factors beyond an individual teacher's control; factors which exert powerful influences on a teacher's activities and, consequently, on pupil pursuits. The first variable sets an upper limit on the total quantity which could have been allocated to the broad curricular area of "reading." The second variable indicates the amount of aide assistance available. The remaining variables convey basic information about allocations of time to instruction in reading. Because we suspect that coding errors seriously affected the observed time allocations in "reading-related" content areas, the "mean direct reading instruction" variable will be relied upon for the best picture of class differences, since this variable omits time in "reading-related" areas. The last variable in Table 4, "mean reading instruction in basic tested content areas," provides an indication of the amount of time allocated to those elemental content areas for which we were able to find corresponding subtest scores. Table A.1 in Appendix A provides a key to the relationships between the last three variables of this table.

Table 4

Basic Instructional Time Allocations

Class	Maximal Possible Exposure to Instruction During the Study Period[1]		Average Teacher Aide Assistance[1]			Mean Reading and Reading-Related Instruction[2]		
	Hours	Hours/Day	Hours	Hours/Day	% of Maximal Possible Exposure to Instruction	Hours	Hours/Day	% of Maximal Possible Exposure to Instruction
1	220.0	5.500	0	0	0	71.41	1.785	32.46
2	230.0	5.750	40.0	1.000	17.39	26.71	.668	11.61
3	220.0	5.500	0	0	0	89.37	2.234	40.62
4	220.0	5.500	0	0	0	86.82	2.171	39.46
5	216.7	5.417	140.0	3.500	64.62	59.44	1.486	27.43
6	216.7	5.417	80.0	2.000	36.92	59.24	1.481	27.34
7	220.0	5.500	220.0	5.500	100.00	38.13	.953	17.33
8	213.3	5.333	133.3	3.333	62.50	61.38	1.535	28.77

Class	Mean Direct Reading Instruction[2]			Mean Reading Instruction in Basic, Tested, Content Areas[3]		
	Hours	Hours/Day	% of Maximal Possible Exposure to Instruction	Hours	Hours/Day	% of Maximal Possible Exposure to Instruction
1	34.68	.8669	15.76	26.12	.6530	11.87
2	21.38	.5346	9.30	12.08	.3019	5.25
3	58.27	1.4568	26.49	37.91	.9479	17.23
4	57.46	1.4365	26.12	34.56	.8639	15.71
5	28.01	.7001	12.93	14.66	.3664	6.76
6	34.08	.8520	15.73	14.10	.3526	6.51
7	22.60	.5649	10.27	12.51	.3129	5.69
8	49.25	1.2312	23.08	21.54	.5386	10.10

[1] Results are based on data collected by interview.

[2] Results are based on data file A.

[3] Results are based on data file D.

Table 5 describes teachers' use of learning settings. The "time allocated to instruction in reading fundamentals as a percent of time allocated to direct reading instruction" has been included to demonstrate the relative extent of each teacher's emphasis on the more basic and fundamental areas of decoding, content clues, and word structure.

The characteristics presented in Table 6 are related to pupil participation in learning activities. The first four variables, "total number of absent days," "mean number of absent days," "number of children absent one or more days," and "percentage of incidence of absenteeisms,"[2] reflect basic student attendance levels. It is obvious that if a student is not present when a teacher teaches a curricular area, he/she cannot learn about that area as a result of the instruction. The next two variables, "mean teacher rating of student engagement" and "observer's class rating of engagement," are taken to be class-level indicators of the extent of student involvement.[3] The remaining variables all represent "adjusted" class level measures of "effective study time," i.e., estimated amounts of time that students were actively engaged in learning the material that the teacher wanted them to learn.[4] The "basic tested" time refers to those time allocations which directly match the achievement subtests.

The variables exhibited in Table 7 are all related to pupil posttest achievement. The first three variables parallel those in Table 2. "Gain" and "average points gained in test score per average hour of instruction in basic, tested, content areas," were included to indicate grossly the fruits of time investments in reading over the eight week period of the study. The gain scores are simple averages of post- minus pre-test scores. The last variable is "rate of gain."[5]

Comparative Characterizations of Classrooms

Teachers face a complex environment within which they must make decisions.

Table 5

Relative Time Allocations to
Basic Instructional Organizations in Curricular Areas

Class	Time Allocated to Small Group Instruction in Reading as a Percent of Time Allocated to Direct Reading Instruction[1]	Time Allocated to Adult Supervised Instruction in Reading as a Percent of Time Allocated to Direct Reading Instruction[1]
1	0	32.06
2	63.86	63.44
3	.70	89.63
4	0	33.81
5	58.28	33.90
6	21.05	83.72
7	79.37	56.18
8	18.08	77.50

Class	Time Allocated to Seatwork Instruction in Reading as a Percent of Time Allocated to Direct Reading Instruction[1]	Time Allocated to Instruction in Reading Fundamentals as a Percent of Time Allocated to Direct Reading Instruction[1]
1	67.16	3.48
2	73.62	4.43
3	44.26	19.22
4	61.80	11.70
5	69.91	30.05
6	36.71	22.75
7	63.01	21.08
8	85.41	13.64

[1] Results are based on data file A.

Table 6

Extent of Pupil Participation in the Learning of Reading

Class	Total Number of Absent Days[1]	Mean Number of Absent Days[2]	Number of Children Absent One or more Days	Percentage of Incidence of Absenteeisms[2]	Mean Teacher Rating of Student Engagement[3]	Observer's Class Rating of Engagement
1	21	.808	9	34.62	.69	.57
2	33	1.179	11	39.29	.79	.79
3	9	.818	4	36.36	.85	.76
4	7	.389	4	22.22	.84	.74
5	12	.600	6	30.00	.59	.65
6	49	1.485	16	48.48	.63	.73
7	25	.735	11	32.35	.57	.57
8	27	.964	10	35.71	.52	.66

Class	Mean Overall, Teacher Estimated, Effective Reading Study Time for Pupils in Hours[3]	Observer Estimated Overall Effective Reading Study Time for Class in Hours[3]	Mean Overall Teacher Estimated, Effective Study Time for Pupils in Basic, Tested, Reading Content Areas in Hours[3]	Observer Estimated Effective Reading Study Time for Class in Basic, Tested, Reading Content Areas in Hours[3]
1	48.90	40.60	17.91	14.89
2	21.22	21.24	9.54	9.18
3	76.14	68.51	32.02	28.82
4	73.19	64.16	29.18	25.57
5	35.15	38.64	8.69	9.53
6	37.57	43.41	8.80	10.30
7	23.18	22.92	7.36	7.13
8	31.33	40.30	11.08	14.22

[1] Figures on tardinesses are not included.

[2] Numbers in this column are calculated by dividing by the number of students followed in a class.

[3] Results are based on data file D.

Table 7

Reading Outcome Chracteristics of Classes

Class	Mean Composite Score on Post-test[1]	Standard Deviation of Composite Score on Post-test[1]	Mean Composite Score on Post-test as a Percent of Maximum Score[1,2]	Gain[1]	Average Points Gained in Test Score per Average Hour of Instruction Basic, Tested, Content Areas
1	219.82	38.68	77.40	18.88	.7228
2	217.19	45.27	76.48	15.33	1.2690
3	244.99	15.95	86.26	6.63	.1749
4	256.78	16.80	90.42	6.93	.2005
5	157.72	61.24	55.54	23.31	1.5900
6	103.96	61.33	36.61	36.36	2.5787
7	132.50	66.06	46.65	16.05	1.2830
8	173.74	67.02	61.18	9.92	.4605

[1] Results are based on data file D.

[2] Maximum possible score is 284.

For example, groups of pupils differ in their individual preparedness as well as in general level of preparation for learning; instructional resources (both human and material) vary greatly in quantity and type; and teachers are differentially prepared (both by training and experience) to prefer and to effectively implement various classroom activities. In addition, organizational configurations beyond the classroom, such as school and district time schedules and programs that require the removal of pupils from classrooms, delimit and constrain a teacher's decision-making. In this section, we will lay out the available data bearing on these conditions in order to clarify the range of choices. We will also explore consequences of these strategic decisions for pupil learning.

Pupil preparation for learning. In our sample, the pupils' initial achievements in reading varied considerably from class to class (Table 2). In the sixth classroom, a typical pupil correctly answered only about 24 percent of the test items; while in the fourth, the performance level was more than three and a half times greater (88%). The classes can be divided into two broad groups: those with relatively good preparation (Classes 1, 2, 3, and 4); and those more poorly prepared (Classes 5, 6, 7, and 8; between 20 and 60 percent correct responses).

Unfortunately, because of the test ceiling effects, it is difficult to judge whether teachers were faced with within-class differences in preparedness. But given the prominence of ceiling effects, the relationship between test standard deviation and test mean for the classes seems to be typical of classrooms that do not vary greatly in homogeneity of preparation.

Resources of teaching. One of the largest influences on teaching decisions is the availability of additional classroom personnel, i.e., teaching aides. For the classes investigated, the quantity of this resource varied enormously. Three classes (1, 3, and 4) had no aides at all; one class (7) had a full-time person; the remaining teachers had assistance from about 17 percent of the time (Class 2)

to 65 percent (Class 5). The classes with better prepared pupils had little or no aide time. Those classes with lower initial achievement levels were provided with significant amounts of aide time. We can, on the basis of preparation and resources, place each class in one of three groups:

a. well-prepared pupils - no aides (1, 3, 4);

b. poorly-prepared pupils - aide assistance(5, 6, 7, 8); and

c. well-prepared pupils - minimal aide assistance (2).

Curricular and setting commonalities. The percentage of content-setting combinations which were actually used (and to which all pupils were exposed) was one of the measures of the commonality of pupil pursuits within a class. (See section on "Classroom Characteristics.") Admittedly, this is an imperfect index of the commonality of pupils' classroom experiences. One would prefer an index which reflects not only the extent to which all pupils were exposed to a common set of experiences, but also whether the degrees of exposure were homogeneous. This more complex assessment would require derivation of an index of similarity of time allocations to content-setting combinations. Classroom summaries of such an index comparing pupils would yield a better characterization of the degree of commonality in pupil experiences. The current index suffers, then, from lack of representation of actual time allocations. However, an inspection of the homogeneity within classes of time allocations across content-setting categories among pupils reveals a close relation between the current index and the degree of homogeneity in the allocations. Thus, it is reasonable that results similar to those cited below would be obtained with a more adequate, time-based index.

Within each of our three resource- and participation-based class groupings, there is a startling cohesiveness in the differential amounts of commonality of pupil experiences within the classes. The single class (2) with well-prepared pupils and a minimal amount of aide support had the least commonality in pupil experiences. The three classes (1, 3, and 4) with well-prepared pupils but no aide support showed the greatest homogeneity in pupil experience. Finally, the

four classes (5, 6, 7, and 8) with less well-prepared pupils but significant aide support exhibited only moderate to low commonality of pupil experiences.

Thus, the degree of individualization is strongly related to available resources and pupil preparation. The most provocative aspect of this result is the clear differences in commonality between classes with aide support and those without. But it would be unwise to overemphasize this finding for so small a sample.

Classroom 2 provided some additional food for thought. It has been qualitatively described as the most individualized of the classes; and clearly it is, if our index has any validity. We have no information, however, on why this level of individualization might have come about. Did this particular teacher have special training or preferences? Does even minimal aide support have potent impact in well-prepared classes? We do not know.

Allocation of time to settings. A very rough measure of diversity in pupil experience is the extent to which large-group instruction is used. At one extreme, whole-class instruction precludes differentiation in the pupils' exposure to particular content areas. Thus, there should be a strong relation between the amount of time allocated to either small or large group instruction and the degree of commonality in pupil experiences. This relation does appear (Table 5, Figure 3). In fact, the three classes with the highest estimated curricular-setting commonality (1, 3, and 4) had essentially no small group instruction. The variation in this relation is somewhat larger among those classes with significant amounts of small group work (2, 5, 6, 7, and 8), since such grouping does not preclude homogeneity; it simply allows heterogeneity.

Extent of adult supervision is not strongly related to either the homogeneity of pupil experiences or the use of small groups. Apparently, teacher aides can be and are used in ways that do not augment adult supervision. Classes with and without aides are widely variable in adult supervision.

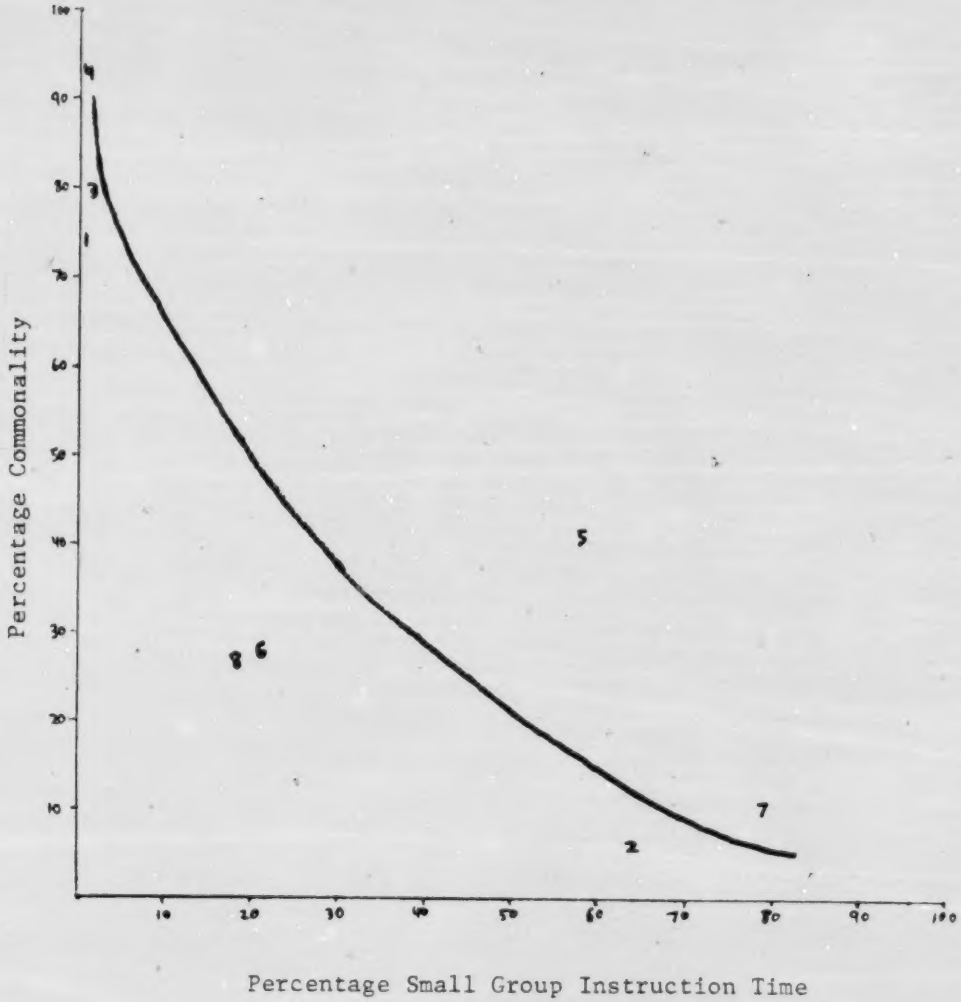

Figure 3. Relationship Between Commonality of Selectivity in Coverage and Time Allocated to Small Group Instruction as a Percentage of Direct Instruction Time for Eight Grade 5 Classes*

* Data, See Tables 3 & 5

Time allocation to seatwork, or to any self-paced instruction, was only marginally related to other characteristics of student preparation, resources, instructional emphasis, and style. Generally, classes that were more individualized in terms of content and setting exposure were also heavier users of self-paced modes of instruction. This relation admitted great variation, however.

Allocation of time to reading content-categories. Since we perceived that the teachers had a more difficult time accounting for "reading-related" instruction than for those classroom activities which were more directly focused, reporting of results will be restricted to content categories I through VI (Table A.3).

The amount of time devoted to "direct reading instruction" (Table 4) varied from about half an hour per week (Class 2) to almost an hour and a half (class 3). This variation of almost three-to-one implies that emphasis on reading varies enormously among fifth grade classrooms. Note also that this differential emphasis was not implemented to compensate for the widely discrepant levels of preparation of these classes. In fact, the two classes with the largest pre-test means (3 and 4) received the most reading instruction. Even instruction in reading fundamentals (Table 4) follows this pattern. Class 3 devoted about 17 minutes per day to such basic instruction, almost 20 percent of total direct instruction. On the other hand, classes with lower pre-test scores (1 and 2) devoted only minimal amounts and percentages of time to fundamentals (one and a half to 2 minutes per day). Thus, some classes spent 12-fold more instructional time on fundamentals compared to other classes.

The pattern of emphasis on direct reading instruction varies with level of preparation (as noted above) and with resource support. However, since the relations do not logically follow from an analysis of pupil needs, it is likely that these curricular choices partially derive from differences in school goals relating to community background, and from teacher preferences, uninformed by

comparisons with those of other teachers.

Another set of curricular allocations is that of curricular time matched to the achievement tests (Table 4). A separate correspondence was made (Table A.1) because only a limited selection of content areas in reading were tested. Allocations to the matched areas varied to a greater extent than the total allocations, and in a different pattern. However, Class 2 as before had the smallest matched allocation (18 minutes per day), while class 3 had the greatest (57 minutes).

Pupil engagement and absenteeism. Pupil engagement was measured by both teacher and observer ratings. The overall mean estimated engagement level was similar for both assessments (about 65%), but the variability over classes was higher for the teacher-based scores (Table 6). If we insist on consensus between both ratings, they tell us that Classes 2, 3, and 4 contained the most engaged pupils, the others (1, 5, 6, 7, and 8) were lower and more highly variable in their engagement (Figure 4). Thus, the three classes with the highest pre-test scores were also the ones most engaged in learning.

If we use these engagement assessments to adjust the mean class times for content areas which match tested content areas, the general pattern is the same as that derived from the unadjusted data (Table 4). The minor exceptions (Classes 1 and 8) conform if teacher-based rather than observer-based data are used. Then, the effective exposure of Class 1 rises (relatively), while that of Class 8 falls, resulting in a considerable discrepancy where rough equality held before.

Absenteeism clearly limits exposure to instruction; it also might be assumed to reflect some of the same pupil characteristics that influence engagement. However, there is no evidence of this. The highest absence rates are those of Classes 2, 6, and 8, while the lowest are for Classes 4 and 5. This pattern relates to no known difference in preparation, resources, or strategy, let alone

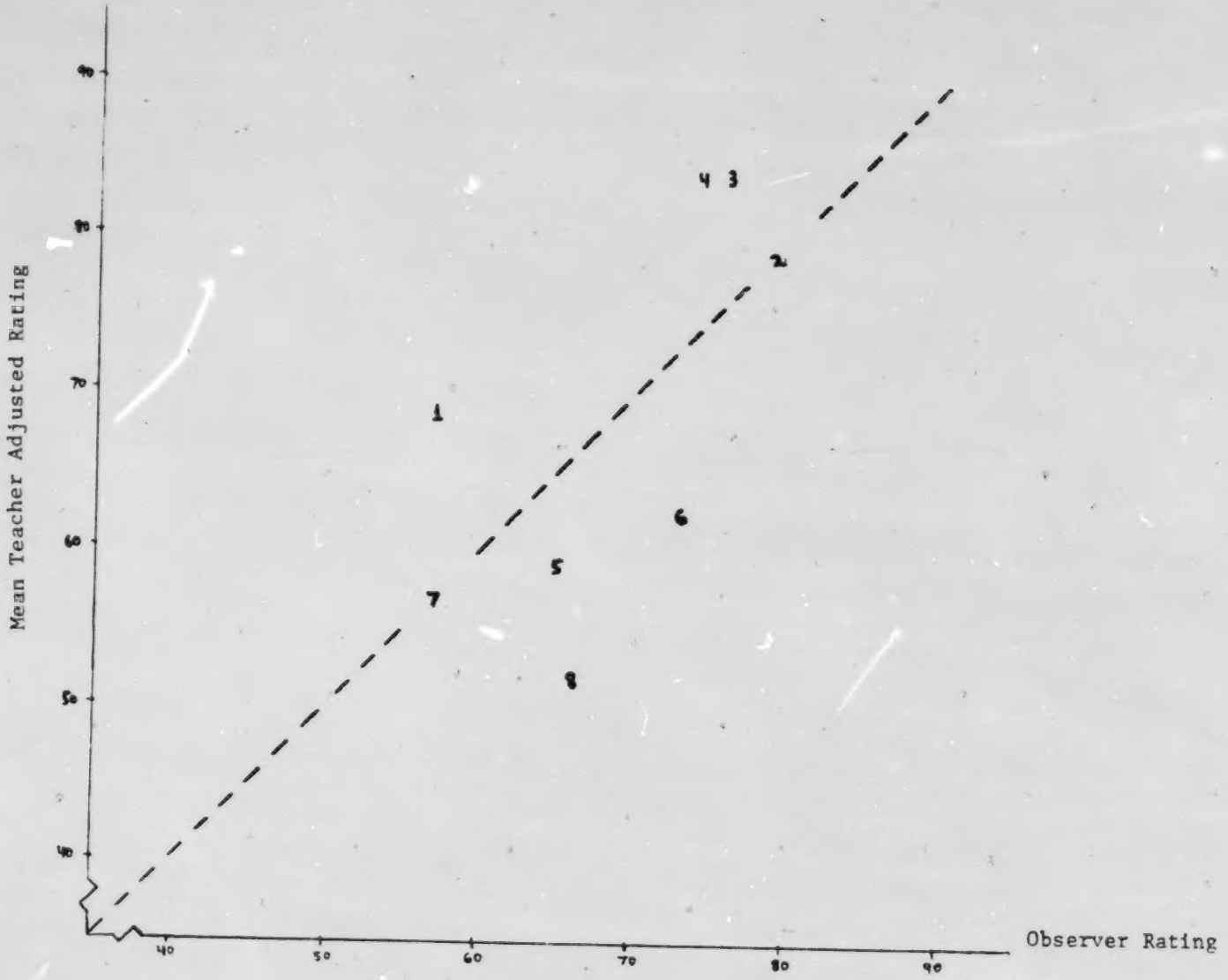

Figure 4: Relationship Between Mean Teacher Ratings of Student Engagement and Observer Ratings of Class Engagement*

*Source: Table 6. Dashed line indicates an ideal relationship where one form of rating would be a perfect substitute for the other in work conducted at class levels of aggregation.

our measures of engagement.

Achievement gains. One of the initial assumptions of our investigation was that achievement gains and their relations to instructional time would inform us about the effect of increases in instructional time on learning, and perhaps even about the relation of teaching strategy to achievement. These hopes were thwarted. The basic problem seems to be that several classes were close to effective ceilings on the test, and that all classes' potential (and actual) gains were more strongly influenced by their pre-test levels than by their time allocations. A plot of the relation between pre-test and gains (Figure 5) reveals a negative regression coefficient of about 0.17, with little scatter around the regression line. This situation leaves little hope of detecting a relation between time and learning. This relationship is discussed later in this report.

Class Descriptions

Class 1. Generally speaking, the first class is typical in regard to many of the characteristics considered here. However, exceptions to this fact related to teaching style. The teacher of Class 1 chose to employ only a small proportion of the potential content x setting areas (67 out of 544; Table 3). This resulted in use of only 33 of the 68 content areas, and four of the eight settings (Table A.4.1, Appendix A). No other teacher reported teaching in so few areas. Furthermore, the instructional approach this teacher followed was probably not highly selective in its directions and communications to pupils; that is, instruction in this class was non-individualized. Also, during the period of the study, this teacher allocated zero time to small group instruction. Thus, it appears that the pupils in this class were directed to participate in most learning activities as a large group, a result consistent with the lack of individualization in instruction. In addition, only relatively small amounts of time were allocated to adult supervised activities and to instruction in the fundamental areas of reading (Table 5).

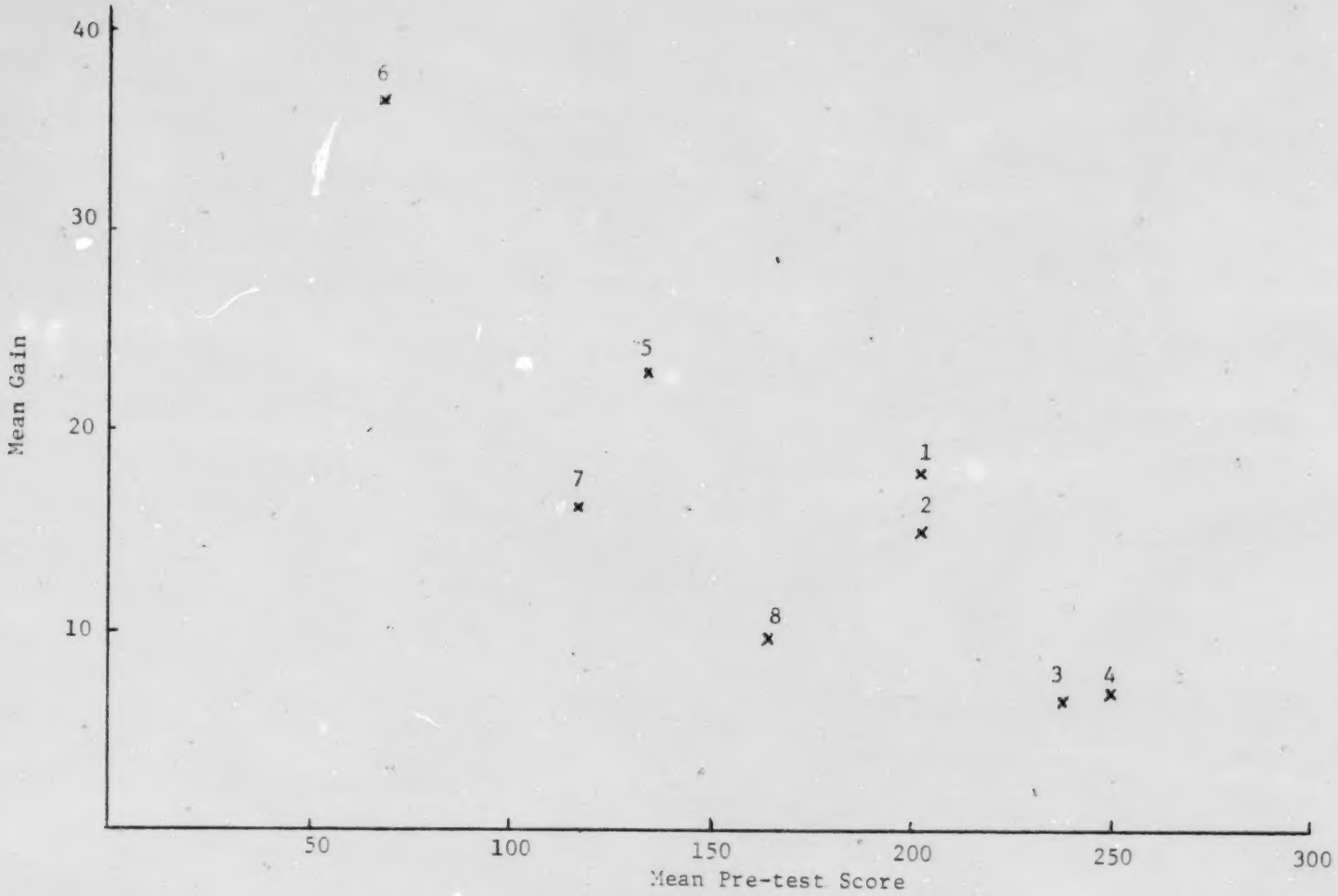

Figure 5: Relationships Between Class Mean Pre-Test and Simple Gain Scores

Source: Tables 2 and 7

This teacher had no teacher aide to assist her (Table 4). Thus, it is perhaps not surprising to find no emphasis on small group instruction; but lack of a teacher aide need not confine instructional strategies to the whole-group type. Since these pupils were reported to be "difficult" and "inattentive," perhaps their teacher felt that small group instruction could lead to greater opportunities for student misbehaviors. Yet the teacher spent relatively little time in active supervision of pupils' work.

The observer's general rating of the class' level of involvement is low (Table 6); but this is somewhat at odds with the teachers' perceptions. However, owing to the way the measurements were taken and summarized, these statistics may well refer to different phenomena; and outright comparisons of them could be misleading.

While the mean posttest score for this class was moderately high (Table 7), so was the mean pre-test score (Table 2).

Class 2. With regard to all measures of initial characteristics, Class 2 appears to have much in common with the first class. However, this similarity does not extend to measures of teaching strategy (Tables 3 through 6; Table A.4.2). Instruction in this class (Table 3) utilized considerably greater numbers of content x setting categories than did Class 1; the instruction was also highly individualized (Table 3). This suggests that a large amount of direct instructional time was devoted to small group and seatwork settings (Table 5). However, the substantial absenteeism (Table 6) probably resulted in instruction which was more individualized than the teacher intended it to be.

Although reading instruction in this class was highly individualized, only small amounts of instruction occurred (Table 4). Pupils in this second class received only about 27 hours of instruction in reading and reading-related areas over the entire time of our student (about 0.7 hours per day). There

were an estimated 230 hours during which the students could have been instructed in reading (Table 4). These pupils could have received the greatest amount of reading instruction of all students in the study; they actually received the least.

Time allocations to direct reading instruction and reading instruction in basic, tested content areas parallel those of reading and reading-related instruction. Since relatively little of the direct reading instruction time was allocated to instruction in reading fundamentals (Table 5), this teachers' apparent de-emphasis of reading instruction might not be severe in its effects on achievement; we might assume that the children had already adequately learned the reading fundamentals.

According to both teacher and observer ratings (Table 6), these students were highly involved in their work, thus making better use of time given to acquisition of reading skills than their counterparts in other classes. However, as mentioned above, the pupils of Class 2 had little opportunity time to advance their reading skills. In spite of this, the average score on the posttest and the average simple gain score were moderately high.

Class 3. At the outset of the study, pupils in the third class possessed more highly developed reading skills than most of the others (Table 2). Furthermore, the instruction they received during the study was unlike that of the other classes in many ways. For example, the pupils were exposed to a large number of content x setting combinations, but the instruction appeared to be most often of the whole-group type (Table 3 and 5). Pupils in this class were exposed to more content areas than those in any other (Table A.4.3); and on the average, this teacher alloacted more time to instruction in reading than did the other teachers (Table 4). Since no teacher aide helped in this class, it is apparent that the teacher supervised most of the learning activities herself (Table 5). Furthermore, relatively little of the instructional time was spent with pupils working independently at their seats (Table 5).

Both teacher and external observer ratings of pupil engagement for this class were high (Table 6). In addition, a great amount of time was allocated to reading. It therefore follows that the indices of "effective reading study time" should be high, and they are (Table 6). However, the low simple gain and rate of gain figures (Table 7) seem to indicate that these students profited little from their extensive exposure to reading instruction. It should be noted that these figures may be misleading because of test ceiling effects.

Class 4. The fourth class is outstanding for its members' high levels of initial reading achievement. The mean composite score on the pre-test was 250 out of a possible maximum of 284 (Table 2). Instruction was not individualized (Table 3). The number of setting x content areas covered was typical of the classes investigated (Table 3 and A.4.4); but over 90 percent of those combinations were used for all the pupils in the class and this was atypical. As in Class 3, a strong emphasis was placed on instruction in reading. This emphasis is indicated by the high time allocation (Table 4). It is clear from Table 5 that this teacher and that of Class 3 used different instructional settings to similar extents. (A slight exception is the relative amounts of indpendent seatwork, which was granted more time in Class 4.)

Both teacher and external observer indicated that the students were highly involved in study (Table 6). Consequently, the estimates of "effective study time" are high.

While the mean posttest score for this class was very high, the average gain and gain rate figures were rather low. Again, the latter results are probably attributable to test ceiling effects.

Class 5. Instruction in Class 5 was varied in coverage, especially in terms of content, but was only moderately individualized (Table 3). Fifty-four content areas were covered; the majority of these were taught via two or more settings (Table A.4.5). Although relatively little direct reading instruction time was

allocated to adult supervised instruction, a comparatively large amount of this time was given to instruction in the fundamentals (Table 5).

The average teacher rating of student involvement in study was low, as was the estimated average "effective study time" based on this rating (Table 6). Despite this, however, the average gain and rate of gain figures for reading achievement in this class are rather high (Table 7).

Class 6. Class 6 stands out because its mean composite score on pre-test was extremely low (Table 2). While the number of content areas covered in this class was typical of the others (Tables 3 and A.4.6), it appears that the instruction was relatively varied in terms of content x setting area utilization, and fairly individualized and differentiated (Table 3). Absolute time allocations to various reading areas were not extreme (Table 4). Most of the direct reading instruction was delivered in adult-supervised independent-seatwork settings (Table 5). Absenteeism posed a problem for this class (Table 6). And although the mean composite posttest score for this class was lower than that of any other, the average gain and rate of gain statistics were the highest (Table 7).

Class 7. Concerning commonality in coverage (Table 3), it appears that the instruction in the seventh class was highly individualized, although content coverage was more typical (Table A.4.7). However, in some cases the teacher failed to record time spent in the reading-related areas taught by the whole-class method. Therefore, the available figures (Table 3) may indicate that instruction was more individualized and differentiated than it really was.

A review of Table 4 shows that little time was allocated to direct reading instruction and to instruction in the basic, tested content areas. Most direct reading instruction that was conducted used small-group settings (Table 5); this was undoubtedly promoted by the constant availability of a teacher aide (Table 4).

Both teacher and external observer ratings of student engagement in study were low. As a consequence of both this and the low time allocation to reading instruction, estimates of "effective study time" were also low (Table 6). Both the mean composite pre- and posttest scores were moderately low as well (Tables 2 and 7).

Class 8. Instructional coverage in reading was not highly varied in the eighth class (Table 3). Only a moderate number of content areas were covered, and most of these were taught in only a few settings (Table A.4.8). However, the instruction was basically individualized (Table 3). Pupils in this class most likely received less overall instruction than pupils in other classes (213 hours; Table 4). But instruction in the reading areas 1.54 hours per day) was not slighted to any great extent because of this. Direct instructon in reading was typically given in the form of independent seatwork (Table 5).

The mean teacher rating of student involvement in study (Table 6) was quite low. However, partly because an extensive amount of time was given to instruction in reading, this low student engagement did not yield excessively low "effective study time." Therefore, we would expect mean composite posttest and gain scores to have been higher than in fact they were (Table 7). Actual ceiling effects cannot explain this.

Allocated Instructional Time and Achievement

Ordinarily, in studies of this kind, relations between measured characteristics are investigated by regression analysis. Such analyses, in the simplest sense, approximate relations by means of a straight line. Thus, only two characteristics of the approximating line need be calculated to assess the relation: the level of outcome (in this case, achievement gain) corresponding to zero on the explanatory characteristic (in this case, time); and the amount of change in outcome corresponding to a change of one unit (minute or hour) in the other characteristic.

In some cases, however, more constraints can be imposed because of the character of the variables studied. For example, in our application, the following are possible specifications:

a. true gains should always be positive or zero, i.e., negative observed score differences are attributable to measurement errors;

b. zero instructional time should lead to no achievement gains;

c. the more time spent learning test-related content, the larger the gain in tested achievement; or at the minimum, true negative relations are impossible.

If we accept these specificiations (or at least the first two) as reasonable, we can implement stronger methods of estimating relations between time and achievement. This can be done because the line which we use to approximate the relation must pass through the origin, i.e., the intercept (the gain corresponding to zero time) is zero. This implies that there are several ways of estimating the relation (i.e., the slope). Three interesting possibilities are:

a. averaging the ratios of gain to time for individuals in a group;

b. averaging the gains for a group and dividing by the average time; and

c. performing an ordinary regression.

The first two also have these advantages: they will likely result in positive estimates, since the average gain will likely always be positive for each group; and they are not as seriously affected by measurement errors in the time assessments (i.e., they are not attenuated) to as great a degree as ordinary regression. We have implemented these procedures with the fifth grade reading data in three areas: decoding; content clues; and the root word and part-separation subscales of word structure.

The results using the first two procedures for the three content areas, using the median as a robust averaging method are reported in Tables 8, 9, and 10. Generally, these results are consistent between the various estimation methods, although they display considerable variability over classes. The ceiling effects described earlier are apparent here as well, the smallest gains corresponding to the highest pre-test levels.

The regression analyses are reported in Table 11. A different tack was taken here, since standard programs with greater flexibility were available. We first tested to see if the relations between time and gain were homogeneous over classes. After finding no evidence of heterogeneity we estimated the common regression slope by pooling the data. Here, we found no statistically significant relations, although the confidence intervals for the slopes were consistent with the results of the other two analyses based on the more stringent assumptions. In fact, allowing for the ceiling effect problem and the attenuation of the regression estimated slopes resulting from errors in the time data, the results were gratifying in their consistency. Finally, we tested to see if there was any evidence to suggest that classes were different in their gains when allocated time was fixed. There was no such evidence (Table 11).

The major conclusion we draw from these analyses is that ceiling effects and sampling variations have resulted in difficulties for the detection of consistent relations which are also precise enough to be useful. The results themselves are consistent over estimation procedures, and are compatible with substantive interpretations of positive and potentially powerful relations between time and learning.

Engagement, Engaged Time, and Achievement Gain

An important conceptual issue in the analysis of data on instructional time, especially as it relates to achievement, is the engagement or involvement of pupils. It seems likely that most real learning occurs during periods when the pupils

Table 8

Achievement Gains and Allocated Instructional Time: Decoding

Class	N	Time (hours)	Medians				Gain	Gain/Time	Med.(gain)/Med.(time)
			Pre-test		Post-test				
			%	Raw	%	Raw			
1									
2									
3	9	2.53	93.8	40.33	93.8	40.33	0	.000	0.00
4	16	1.47	93.8	40.33	93.8	40.33	0	.000	0.00
5	16	1.42	63.2	27.16		31.66	2	1.83	1.38
6	15	0.53	35.6	15.32		16.00	9.32	18.90	17.46
7									
8	4	1.08	52.7	22.67		28.33	3	4.32	2.76

Table 9

Achievement Gains and Allocated Instructional Time: Context Clues

Class	N	Time (hours)	Medians				Gain	Gain/Time	Med.(gain)/Med.(time)
			Pre-test		Post-test				
			%	Raw	%	Raw			
1	22	0.52	76.6	24.50	86.4	27.66	1.34	2.52	2.59
2	9	0.78	67.2	21.50	78.1	25.00	3.16	6.30	4.03
3	9	2.23	87.0	27.83	91.7	29.33	1.50	0.66	0.67
4	16	3.02	93.5	29.91	91.1	29.16	-0.08	0	-0.02
5	16	2.35	54.7	17.50	62.8	20.08	2.75	1.08	1.17
6	15	0.58	14.1	4.50	18.7	6.00	1.68	2.52	2.88
7	9	0.77	56.7	18.16	52.6	16.83	0.35	0.42	0.46
8	8	1.88	42.4	13.58	46.1	14.75	1.17	0.96	0.62

Table 10

Achievement Gains and Allocated Instructional Time: Word Structure

			Medians						
Class	N	(hours)	Pre-test		Post-test		Gain	Gain/Time	Med.(gain)/Med.(time)
			%	Raw	%	Raw			
1									
2	8	0.43	89.4	23.25	92.3	24.00	0.75	1.71	1.73
3	9	4.18	89.7	23.33	94.8	24.66	1.33	0.30	0.32
4	16	0.90	94.8	24.66	94.8	24.66	0	0	0
5	10	0.70	78.5	20.42	86.8	22.58	2.00	2.61	2.86
6	15	0.97	42.3	11.00	64.1	16.66	1.82	1.86	1.88
7	9	1.18	74.3	19.33	75.0	19.50	1.33	0.96	1.12
8	14	2.55	86.8	22.58	89.1	23.16	1.34	0.75	0.53

Table 11

Parellelism, Regression and Covariance Analyses of Instructional Time and Achievement Gains

Summary Statistic	Skill Area: Decoding	Skill Area: Context Clues
1. Parallelism Test		
F	0.04	1.10
df	4/50	7/88
p	.82	.37
2. Regression Analysis		
coefficient	-.474(-3.27,2.32)	-1.704(-4.33, .92)
standard error	1.398	1.314
t	-.0464	-1.2983
R^2	.0005	.0174
R	.0233	.1320
F	.03	1.69
df	1/54	1/95
p	.86	.20
3. Test of Differences in Rate of Gain over Classes		
F	2.42	0.74
df	5/54	7/95
p	.06	.64

Table 12

Relation Between Teacher Ratings of Engagement - Total Pupils

No Adult Present	Adult Present									
	1	2	3	4	5	6	7	8	9	
1		2				2				4
2		1	2	2	1	3	2			11
3			2	3	2				1	8
4				2	2	7	1	1		13
5					1	5	5	1		12
6					1	3	9	6		19
7							12	21	4	37
8							1	16	10	27
9									12	12
	0	3	4	7	7	20	30	45	27	142

Median AP = 7.54

Median NAP = 6.64

Table 13

Relation Between Teacher Ratings of Engagement - Class 6

No Adult Present	Adult Present									
	1	2	3	4	5	6	7	8	9	
1										
2				1						1
3										0
4				2		2	1			5
5						1				1
6							4	1		5
7							1	4	3	8
8									2	2
9										0
	0	0	0	3	0	3	6	5	5	22

are attentive to learning activities; consequently, if appropriate adjustments of allocated time are made to take differential attentiveness of pupils into account, stronger relations with achievement should emerge. This concept provides the rationale for analyses involving the judged engagement rates of the pupils.

Two primary issues regarding engagement data are reliability and validity. The only available data on validity (presented earlier) showed that moderate agreement existed between the class means of the teacher and observer ratings.

Table 12 presents the relation between two teacher ratings of pupils general levels of engagement: with and without adults present (Table 13 presents analogous information within a specific class). These assessments are highly related; but this is probably misleading, because few kinds of components (e.g., time of rating or time of engagement of rating error) enter into discrepancies between these ratings.

The change in the relation between time and achievement after adjustment for engagement was explored. In at least one of the classes (Class 6), the correction did not strengthen the relationship. In fact, the relationship between time and learning was weakened. However, this result should not be over interpreted since data were available for only 15 students from Class 6.

---

[1] "Maximal possible exposure to instruction" was calculated by finding the amount of time a student could be in his/her class on any given day and multiplying this amount by 40 days.

[2] "Mean number of absent days" was calculated by dividing the appropriate number of absent days by the number of "followed" children, the basic referrant group in this case. "Percentage of incidence of abseenteeisms" was calculated by dividing the "number of (followed) children absent one or more days" by the number of followed children and multiplying by 100.

[3] The first of these two was calculated by taking two teacher ratings of each student's involvement, transforming each by the use of the formula 1/18 + (R-9)1/9 (where R is the rating assigned by the teacher), averaging these to produce an involvement score for each child, and then averaging over all the students in the class. This procedure distributes the ratings evenly between 0 and 100 percent. Values of the second variable were given to us in their current form (See Table A.2, Appendix A).

[4] The first and third of these variables, "mean overall teacher-estimated effective reading study time" and "mean overall teacher-estimated effective study time for pupils in basic tested reading content areas," were calculated by multiplying the average transformed teacher rating of each pupil by the teacher's actual time allocations (for reading and reading-related, and basic tested, content area instructions) to that pupil, and then calculating the class average of these products. Values for the other variables, "observer estimated overall erfective reading study time" and "observer estimated overall effective reading study time for class in basic tested content areas," were derived by simply multiplying the observer's estimate of the percentage of pupils involved in learning by the mean time allocation figures.

[5] This rate was calculated by dividing the average gain score by the average amount of instructional time the teacher allocated to the curricular areas included.

IV. SUMMARY

Allocation of instructional time in reading was examined in eight fifth grade classes. The major purpose of the work was to enlighten the design and conduct of Phase III-B of BTES. The classes were remarkably different in a number of important ways. Differences in breadth of content coverage, as reflected by the number of specific content categories taught, were great. In addition, the kinds of settings employed in the classrooms and the exposure of students in the same class to a variety of settings were different. When differences in content and setting exposure are combined with wide differences in amounts of time allocated to the content-setting combinations, it was clear that the opportunity-to-learn for students varied greatly from once class to another. It was also found that opportunity-to-learn was quite difference from student to student within any given class. In the latter case, differential student absenteeism appeared to have an effect. Several indicators of individualization of instruction, cast in terms of allocated time patterns, were suggested.

Mean teacher ratings of student engagement compared reasonably well with independently observed class averages of engagement. However, these data did not allow comparison at the individual level since observer data on individual students were not available.

The analyses of allocated time and achievement were clouded by severe ceiling effects. Several possible strategies for analyses were suggested but the results obtained with this data set were clearly affected by the test ceilings.

Reading instruction at grade 5 has some inherent characteristics which make research in the area somewhat difficult. The content of reading at this level is quite heterogeneous. Most of the fundamental skills required for

reading have been acquired. (Certainly the students tested very well in the "fundamentals.") Whether or not these skills have "come together" to produce mature readers is another question. By grade 5, instruction in reading begins to center on comprehension, synthesis, and evaluation and achievement in these areas does not seem to have single or linearly related sources. Influences outside school as well as school instruction may be expected to have a relatively large impact in these areas.

In spite of these difficulties the current study provided a number of insightful characterizations of reading instruction. It is clear that patterns of time allocation to content-setting combinations vary both within and between classes and that these differences may have important implications for student learning.

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APPENDIX A

Table A.1. Correspondences Among Reading Subtests and Elemental Content Areas

	Content Area	Sub-Test
Decoding	3	5R1
	4+5+9	5R2
	8	5R3
	3+4+5+8+9	5R4
Context Clues	16	5R5
	17	5R6
	19	5R7
	16+17+19	5R8
Word Structure	22+23+24	5R9+5R10
	26	5R11+5R12+5R13
	22+23+24+26	5R14
Word Meaning	28	5R15
	31	5R19
	32	5R17
	33	5R18
	34	5R20
	28+31+32+33+34	5R21
Comprehension	36	5R26
	37	5R27
	38	5R28
	39	5R29
	40	5R22
	41	5R23
	42	5R24
	43	5R25
	44	5R30
	36 through 44	5R26 through 5R30 or 5R22 through 5R25 plus 5R30
Application	46	5R32c + 5R32d
	49	5R34
	50	5R33
	51	5R32b
	52	5R32a
	53	5R32e
	46+51+52+53	5R32a through 5R32e
	46+49 through 53	5R32a through 5R32e +5R33+5R34

Table A.2

Estimates of Average Class Engagement
Grade 5 Reading

Class ID Number	Average Number of Students Observed	Number of Time Samples	Time Sample Interval (minutes)	Average Engagement*
01	19	42	5	.57
02	13	14	4	.79
03	9	54	4	.76
04	18	49	4	.74
05	13	46	4	.65
10	21	26	4	.73
12	21	21	4	.57
15	17	47	4	.66

* These estimates were calculated from one day of observation per class. In all cases data were collected during class time which was allocated to reading activities. Since teachers allocate varying amounts of time to reading, the time period covered by the observation differs considerably. The observers counted the number of students engaged at four minute intervals (with one exception) and recorded the number of students engaged, the time, and the number of students in the classroom who were part of the BTES study and who were nominally working on reading activities. The average engagement was calculated by summing the number of students engaged over the total number of time samples and dividing by the sum of the number of students in the classroom being followed by BTES and nominally working on reading activities. No distinctions have been made between subareas of content within reading or setting combinations.

Table A.3

List of Skills for Reading
Grades 2 and 5

I. DECODING (Letter sound correspondence)

1. Single consonants
2. Consonant blends and digraphs
3. Variant consonants (c, g)
4. Vowels - short
5. Vowels - final "e" pattern - long vowels
6. Vowels - digraphs
7. Vowels - dipthongs
8. Vowels - vowels + r (car)
9. Complex, multi-syllabic
10. Silent letters
11. Sound substitution tasks
12. Sight words
13. Automaticity of word recognition
14. Other

II. CONTEXT CLUES (Fill blanks, predict)

15. Choosing word(s) which fit grammatical context
16. Choosing word(s) which make best sense (semantic appropriateness)
17. Choosing correct form of word
18. Choosing word with correct initial consonant
19. Choosing correct pronoun
20. Other

III. WORD STRUCTURE

21. Compound Words
22. Identification of root words
23. Prefixes - meaning and use
24. Suffixes - meaning and use
25. Contractions
26. Syllables
27. Other

IV. WORD MEANING

28. Synonyms
29. Antonyms
30. Vocabulary building
31. Pronoun reference
32. Multi-meaning words in context
33. Unfamiliar words in context
34. Figurative language
35. Other

Table A.3 (continued)

V. COMPREHENSION - Text

36. Understanding event detail
37. Understanding description
38. Understanding relationships
39. Understanding main idea
40. Literal recall
41. Translation of ideas
42. Synthesis of ideas, inference
43. Going beyond the text, prediction
44. Recognizing facts and opinions
45. General comprehension

VI. APPLICATION

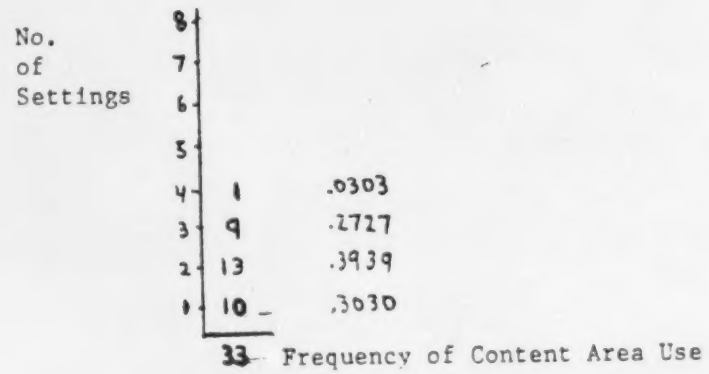
46. Understanding directions
47. Picture interpretation to aid comprehension
48. Dictionary skills
49. Reference sources in books (table of contents, index, glossary)
50. Choosing reference sources (dictionary, encyclopedia, card catalog)
51. Understanding signs
52. Understanding letters
53. Understanding maps
54. Understanding graphs
55. Reading for different purposes
56. Oral reading
57. Reading for enjoyment
62. Silent reading

VII. READING RELATED

58. Spelling
59. Grammar
60. Creative writing
61. Reading in content areas
63. Listening (to story or tapes)
64. Penmanship and copying
65. Standardized tests
66. Foreign language
67. Music (reading lyrics)
68. Dramatics (plays, choral reading)

Table A.4.1 Class 1, Settings by Content Areas in Reading

Settings	Content Areas
8	16 34 39 41,42 46,47 50 56 58 63
7	
6	15,16,17,26 36,38,39,40,41,42,43,44,45 47,48,49,50,51,53,54,55,56,57 59,60,61
5	
4	30 34 38,34,40,41,42,43 48,49,50,51,53,54,55 57 59,60,61,63,66
3	
2	30,32 40 47,48 50 59,60,61
1	



Class 1

Table A.4.2 Class 2, Settings by Content Areas in Reading

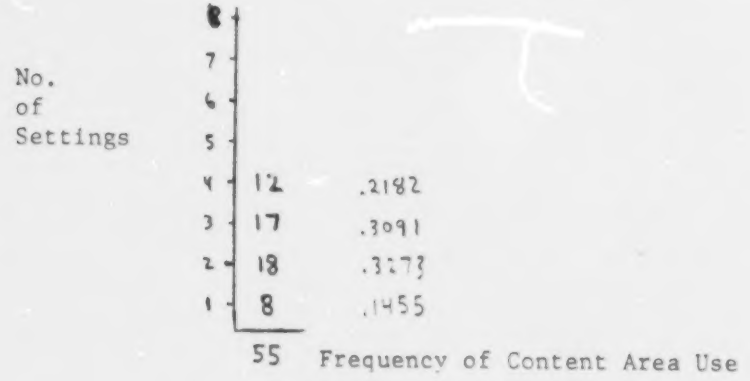
Settings	Content Area
8	
7	
6	23,24,26 28,29,30 32 34,35,36 38,39,40 45 56,57 60
5	30,31 33 36,37,38,39,40,41,42,43,44,45,46 50 53,55,56,57 60,61,62,63
4	16 26 28,29 36 38,39,40 42,43 45 50 55,56 59 61
3	30 34 36,37 40 44 46 49,50 55,56 61 68
2	16 48 57 61
1	16 27,28,29,30,31,32,33,34,35,36 38,39,40 42 45,46,48,49,50,52 55,56,57,58,59 61,62,63,65,67

Class 2

No. of Settings		
8		
7		
6		
5	4	.0976
4	7	.1707
3	6	.1463
2	14	.3415
1	10	.2439
	41	Frequency of Content Area Use

Table A.4.3 Class 3, Settings by Content Areas in Reading

Settings	Content Area
8	
7	
6	5,6,7 15,17,19 22,23,24 30,31 34 36,37,38,39,40,41,42,43,44,45 55 57,58,59,60,61 63,6
5	11,14 17 26 30 33,34 36,37,38,39,40,41 43 48 55 60
4	2,3,4,5,6,7,8,10 14,15,17,19,20,21,22,23,24 27,28,30,31,32,33,34,35,36,37,39,39,40,41,42,43,44,45,46,47,48,49,50,53,54,55,56,57,58,59,60,61,62,63
3	
2	5,6,7,8,10 14 17 21,22,23,24 28,30 32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,53,54,55,56,57,58,59,60,61,62,63,6
1	

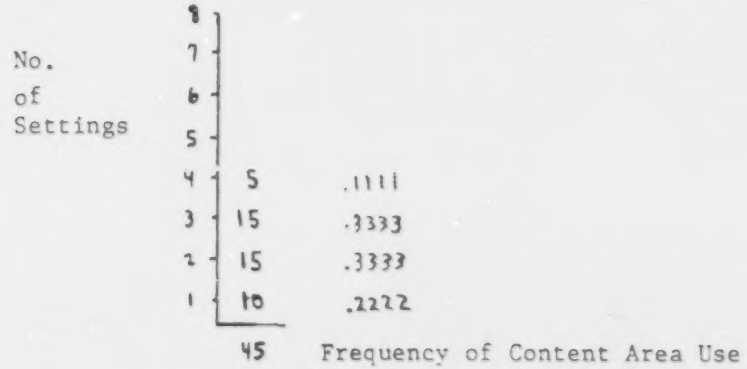


Class 3

A-7

Table A.4.4 Class 4, Settings by Content Areas in Reading

Settings	Content Area
8	30 38,39 42,43,45,46 48,49,50 53 57 61,62
7	
6	4,5,6,8,16,17,19,21,22,23,24,25,26,28,29,30,31,34 36,38,39,40,41,42,43,45 48,49,50,52,53 57,58,59,60,61,62 65
5	
4	4,5,6,8,16,17 22,23,24,25,26,28,29,30,31 35,36,38,39,40,41,42,43,45 47,48,49 53,56,57,58,59,60,61,62,63,65,67,68
3	
2	5 8,16,17,19 24 26,28 30 45 48 53 58 61
1	



Class 4

Table A.4.5 Class 5, Settings by Content Areas in Reading

Settings	Content Area
	41 46 56 59 63
5	1,2,3,4 5,6,7,8 14 16,17,18 22 24,25,26 32,33 36,37,38,39,40,41,42 44 48 57,58,59,60 62
4	1,2,3,4,5,6,7,8,10,11,14,15,16,17,18,20,21,22,23,24,25,26,28 32,33,34,36,37,38,39,40,41,42,43,44 47,48 57,58,59,60 62 65,66
3	5,6 45 50,53,56,57,58 61 63 67,69
2	28 46 60 66 68
2	6,7 58,59,60
1	6,7 15,16,17 30 40,41 53 57,58 60 65

Class 5

No. of Settings		
8		
7		
6		
5	3	.0556
4	4	.0741
3	4	.0741
2	30	.5556
1	13	.2407
	54	Frequency of Content Area Use

A-9

Table A.4.6 Class 6, Settings by Content Areas in Reading

| Settings | Content Area | | |

Table A.4.7 Class 7, Settings by Content Areas in Reading

Settings	Content Area
8	
7	15
6	2 — 32,33 — 36 — 44 — 58 — 62
5	13 — 15,16 — 25,26,30,32 — 37,38,39,40,41,42,43 — 45 — 48 — 50,55,56,58 — 60,61,62 — 64,65
4	23,24,25, 30 — 33 — 38 — 41,42,43 — 45 — 56,58,59 — 61,62
3	1,2,3,7,10 — 14,15,16,20,22,23,24 — 26,30,32 — 34,35,36,37,38,39,40,41,42,43 — 45 — 49 — 55,56,58,59 — 62,63
2	39 — 44,45 — 56,58,59
1	3 — 23,24 — 26,30,32 — 37 — 39 — 43 — 45,47,48,49 — 55,56,58 — 62,63

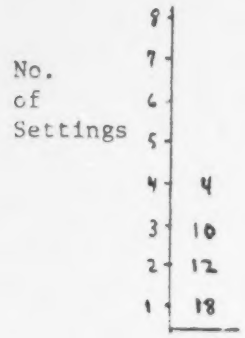
Class 7

No. of Settings		
7		
6	1	.0227
5	3	.0682
4	4	.0909
3	10	.2273
2	12	.2727
1	14	.3182
	44	Frequency of Content Area Use

A-11

Settings	
8	
7	
6	36,37 39,40 45 58,59,61,62
5	3 6,7 11 22,23,24 28 30,32,33,34 36,37,38,39,40,41,42 45 98 62
4	50,53,56,57,58 61
3	56
2	4,5,6 8,10 14,16,17,18,22,23,24,26 29,30,32,33,34,35,36 38,39,40,41,42,43,44,45,46,48,50,53,56 58,59,61,62,63
1	10 24,26 30 33 37 39 41 45 48 56 62

Class 8



4	.0909
10	.2273
12	.2727
18	.4091

Frequency of Content Area Use

A-12

Table A.5 Data Concerning Achievement Gain, Engaged Time, and Allocated Time for Class 6 - Decoding

Student	Eng.A	Eng.B	Ave Eng.	Area Time	Gain	(Ave Eng. x Area Time) Effective Area Study Time
181	5	6	.5555	26	9.33	14.44
184	8	9	.8888	32	5.00	28.44
185	7	7	.7222	38	12.00	27.44
190	4	7	.5555	32	12.33	17.78
192	7	8	.7778	32	5.33	24.89
195	4	4	.3888	30	-1.67	11.66
196	4	6	.5000	38	15.00	19.00
198	2	4	.2777	38	8.00	10.55
199	7	8	.7778	26	13.33	20.22
201	6	8	.7222	38	14.67	27.44
202	6	7	.6666	32	1.34	21.33
203	6	7	.6666	32	-1.66	21.33
204	6	7	.6666	22	10.00	14.67
205	4	4	.3888	28	-2.66	10.89
208	7	9	.8333	24	9.33	20.00

*Eng is an abbreviation for Engagement.

APPENDIX B

Table B.1

Elemental Content Areas Involved in Various Aggregate Content Categories

Content Area	Decoding	Context Clues	Word Structure	Word Meaning	Comprehension	Application	Reading-Related	Fundamentals	Basic, Tested Content	Direct Reading
1	x							x		x
2	x							x		x
3	x							x	x	x
4	x							x	x	x
5	x							x	x	x
6	x							x		x
7	x							x		x
8	x							x		x
9	x							x	x	x
10	x							x	x	x
11	x							x		x
12	x							x		x
13	x							x		x
14	x							x		x
15		x						x		x
16		x						x	x	x
17		x						x	x	x
18		x						x		x
19		x						x		x
20		x						x	x	x
21			x					x		x
22			x					x		x
23			x					x		x
24			x					x		x
25			x					x		x
26			x					x		x
27			x					x		x
28				x					x	x
29				x						x
30				x						x
31				x					x	x
32				x					x	x
33				x					x	x
34				x					x	x

Content Area	Decoding	Context Clues	Word Structure	Word Meaning	Comprehension	Application	Reading-Related	Fundamentals	Basic, Tested Content	Direct Reading
35			x							
36					x					x
37					x				x	x
38					x				x	x
39					x				x	x
40					x				x	x
41					x				x	x
42					x				x	x
43					x				x	x
44					x				x	x
45					x				x	x
46						x				x
47						x			x	x
48						x				x
49						x				x
50						x			x	x
51						x			x	x
52						x			x	x
53						x			x	x
54						x			x	x
55						x				x
56						x				x
57						x				x
58						x				x
59							x			
60							x			
61							x			
62							x			
63						x				x
64							x			
65							x			
66							x			
67							x			
68							x			

Table B.2

Number and Percentage of Teachers Using Each Super Content Area - Setting Combinations

Content Area	Setting Combinations 111	112	121	122	211	212	221	222	
1	3 (37.5)	4 (50.0)	2 (25.0)	4 (50.0)	4 (50.0)	4 (50.0)	0 (0.0)	0 (0.0)	2.6 (32.8)
2	2 (25.0)	4 (50.0)	2 (25.0)	4 (50.0)	3 (37.5)	4 (50.0)	1 (12.5)	1 (12.5)	2.6 (32.8)
3	4 (50.0)	4 (50.0)	2 (25.0)	5 (62.5)	4 (50.0)	5 (62.5)	0 (0.0)	0 (0.0)	3.0 (37.5)
4	4 (50.0)	4 (50.0)	4 (50.0)	6 (75.0)	5 (62.5)	5 (62.5)	0 (0.0)	3 (37.5)	3.9 (48.4)
5	5 (62.5)	6 (75.0)	3 (37.5)	7 (87.5)	6 (75.0)	8 (100.0)	2 (25.0)	3 (37.5)	5.0 (62.5)
6	5 (62.5)	7 (87.5)	5 (62.5)	8 (100.0)	5 (62.5)	8 (100.0)	1 (12.5)	3 (37.5)	5.3 (65.6)
7	4 (50.0)	8 (100.0)	4 (50.0)	8 (100.0)	4 (50.0)	8 (100.0)	2 (25.0)	3 (37.5)	5.1 (64.1)
	3.4 (42.2)	4.6 (57.8)	2.8 (34.4)	5.3 (65.6)	3.9 48.4)	5.3 (65.6)	0.8 (9.4)	1.6 (20.3)	3.4 (43.0)
	Guided Seatwork with few pupils	Guided Seatwork with many pupils	Small Guided Group	Large Guided Group	Unguided Seatwork with few pupils	Unguided Seatwork with many pupils	Unguided small group	Unguided large group	

Adult: 1 involved; 2 not involved

Pacing: 1 seatwork; 2 groupwork

Group Size: 1 small (1-9); 2 large (10 or more)

Table B.3

Reading Related Time
Percent Allocation by Content Category

Class	Total Time (minutes)	General Content Categories						
		1	2	3	4	5	6	7
1	4284.36	0.0	0.9	0.8	1.5	15.2	30.2	51.4
2	1602.36	0.0	1.6	2.0	16.5	26.6	33.9	20.1
3	5362.00	4.3	3.2	5.0	8.8	25.0	18.9	34.8
4	5209.27	1.8	3.4	2.5	7.3	21.9	29.2	33.8
5	3566.50	7.6	5.2	1.3	3.6	12.6	16.8	52.9
6	3554.36	2.4	2.3	8.4	2.9	12.3	29.2	42.5
7	2288.04	4.4	3.7	4.3	9.6	19.7	17.5	40.7
8	3682.98	2.5	2.2	6.3	7.0	12.1	50.2	19.8

Table B.4

Direct Instruction in Reading
(Excluding Support Activities)

Class	Total Time (minutes)	General Content Categories					
		1	2	3	4	5	6
1	2080.52	0.0	1.8	1.7	3.0	31.4	62.1
2	1282.94	0.0	2.0	2.5	20.6	33.3	42.4
3	3496.20	6.6	5.0	7.6	13.5	38.4	29.0
4	3447.55	2.7	5.2	3.8	11.1	33.0	44.2
5	1680.31	16.2	11.0	2.9	7.6	26.8	35.6
6	2044.72	4.1	4.0	14.7	5.0	21.4	50.8
7	1355.78	7.4	6.3	7.3	16.2	33.2	29.5
8	2954.86	3.1	2.7	7.8	8.8	15.1	62.5

Table B.5

Time Allocations (in Minutes) to
General Content Categories

Class	Content Categories						
	1	2	3	4	5	6	7
1	0.0	37.4	35.0	63.0	652.3	1292.8	2203.8
2	0.0	25.1	31.8	262.2	424.2	539.7	319.4
3	231.0	174.1	266.8	471.6	1337.9	1014.8	1865.8
4	93.3	179.2	130.8	282.2	1139.0	1523.0	1761.7
5	271.9	184.8	48.1	127.3	449.8	598.4	1886.2
6	84.1	81.2	299.9	102.4	438.5	1038.5	1509.6
7	100.8	85.6	99.5	220.3	450.1	399.6	932.8
8	92.0	80.6	230.4	259.5	445.1	1847.3	728.1

APPENDIX C

Average Pupil Time Allocations to
Major Content and Setting Categories
by Class

Figure C.1 Class 1, Aggregate Content Areas Sums of Mean Time Allocation (n = 25)

Content	Adult Present Seatwork Small Group	Adult Present Seatwork Large Group	Adult Present Non-Seatwork Small Group	Adult Present Non-Seatwork Large Group	No Adult Present Seatwork Small Group
1 Decoding	0.0	0.0	0.0	0.0	0.0
2 Context Clues	0.0	0.0	0.0	0.0	0.0
3 Word Structure	0.0	0.0	0.0	0.0	0.0
4 Word Meaning	0.0	22.88	0.0	20.00	0.0
5 Comprehension-Text	0.0	15.00	0.0	184.32	0.0
6 Application	0.0	151.64	0.0	273.20	0.0
7 Reading-Related	0.0	82.20	0.0	1160.28	0.0
Total	0.0	271.72	0.0	1637.80	0.0

Figure C.1 (cont'd)

Content	No Adult Present Seatwork Large Group	No Adult Present Non-Seatwork Small Group	No Adult Present Non-Seatwork Large Group	Total
1 Decoding	0.0	0.0	0.0	0.0
2 Context Clues	22.00	0.0	15.36	37.36
3 Word Structure	35.00	0.0	0.0	35.00
4 Word Meaning	0.0	0.0	20.16	63.04
5 Comprehension-Text	405.96	0.0	47.04	652.32
6 Application	744.72	0.0	123.24	1292.80
7 Reading-Related	417.96	0.0	543.40	2203.84
Total	1625.64	0.0	749.20	4284.36

Figure C.2 Class 2, Aggregate Content Areas Sums of Mean Time Allocations (n = 19)

Content	Adult Present Seatwork Small Group	Adult Present Seatwork Large Group	Adult Present Non-Seatwork Small Group	Adult Present Non-Seatwork Large Group	No Adult Present Seatwork Small Group
1 Decoding	0.0	0.0	0.0	0.0	0.0
2 Context Clues	7.68	11.58	0.0	5.79	0.0
3 Word Structure	1.32	0.0	0.0	7.89	0.0
4 Word Meaning	123.74	0.0	10.11	15.79	61.21
5 Comprehension-Text	128.05	0.0	12.00	106.74	126.32
6 Application	177.58	25.53	59.58	120.53	111.74
7 Reading-Related	102.32	19.74	14.21	65.79	47.37
Total	540.68	56.84	95.89	322.53	346.63

Figure C.2 (cont'd)

Content	No Adult Present Seatwork Large Group	No Adult Present Non-Seatwork Small Group	No Adult Present Non-Seatwork Large Group	Total
1 Decoding	0.0	0.0	0.0	0.0
2 Context Clues	0.0	0.0	0.0	25.0
3 Word Structure	22.63	0.0	0.0	31.8
4 Word Meaning	51.37	0.0	0.0	262.2
5 Comprehension-Text	51.05	0.0	0.0	424.1
6 Application	44.74	0.0	0.0	539.0
7 Reading-Related	70.00	0.0	0.0	319.4
Total	239.79	0.0	0.0	1602.1

Figure C.3 Class 3, Aggregate Content Areas Sums of Mean Time Allocation (n = 10)

Content	Adult Present Seatwork Small Group	Adult Present Seatwork Large Group	Adult Present Non-Seatwork Small Group	Adult Present Non-Seatwork Large Group	No Adult Present Seatwork Small Group
1 Decoding	0.0	47.80	0.0	173.80	1.40
2 Context Clues	0.0	32.70	0.0	112.70	0.70
3 Word Structure	0.0	54.20	0.0	158.60	1.40
4 Word Meaning	0.0	132.60	0.0	263.00	7.20
5 Comprehension-Text	0.0	458.90	0.0	765.10	11.50
6 Application	0.0	458.90	0.0	475.50	2.40
7 Reading-Related	0.0	434.70	0.0	1310.40	1.50
Total	0.0	1619.80	0.0	3259.10	26.10

Figure C.3 (cont'd)

Content	No Adult Present Seatwork Large Group	No Adult Present Non-Seatwork Small Group	No Adult Present Non-Seatwork Large Group	Total
1 Decoding	8.00	0.0	0.0	231.00
2 Context Clues	28.00	0.0	0.0	174.10
3 Word Structure	52.60	0.0	0.0	266.80
4 Word Meaning	68.80	0.0	0.0	471.60
5 Comprehension-Text	102.40	0.0	0.0	1337.90
6 Application	78.00	0.0	0.0	1014.80
7 Reading-Related	119.20	0.0	0.0	1865.80
Total	457.00	0.0	0.0	5362.00

Figure C.4.. Class 4, Aggregate Content Areas Sums of Mean Time Allocation (n = 18)

Content	Adult Present Seatwork Small Group	Adult Present Seatwork Large Group	Adult Present Non-Seatwork Small Group	Adult Present Non-Seatwork Large Group	No Adult Present Seatwork Small Group
1 Decoding	0.0	4.00	0.0	22.11	0.0
2 Context Clues	0.0	34.00	0.0	14.33	0.0
3 Word Structure	0.0	4.00	0.0	37.44	0.0
4 Word Meaning	0.0	26.00	0.0	84.94	0.0
5 Comprehension-Text	0.0	8.00	0.0	378.67	0.0
6 Application	0.0	85.17	0.0	466.83	0.0
7 Reading-Related	0.0	66.50	0.0	898.78	0.0
Total	0.0	227.67	0.0	1903.11	0.0

Figure C.4. (cont'd)

Content	No Adult Present Seatwork Small Group	No Adult Present Non-Seatwork Small Group	No Adult Present Non-Seatwork Large Group	Total
1 Decoding	67.17	0.0	0.0	93.28
2 Context Clues	130.89	0.0	0.0	179.22
3 Word Structure	89.39	0.0	0.0	130.83
4 Word Meaning	247.61	0.0	23.61	382.17
5 Comprehension-Text	685.00	0.0	67.33	1139.00
6 Application	749.22	0.0	221.83	1523.05
7 Reading-Related	714.94	0.0	81.50	1761.72
Total	2684.22	0.0	394.28	5209.27

Figure C.5. Class 5, Aggregate Content Areas Sums of Mean Time Allocation (n = 16)

Content	Adult Present Seatwork Small Group	Adult Present Seatwork Large Group	Adult Present Non-Seatwork Small Group	Adult Present Non-Seatwork Large Group	No Adult Present Seatwork Small Group
1 Decoding	8.00	24.00	0.0	36.00	164.12
2 Context Clues	12.75	0.0	0.0	0.0	146.62
3 Word Structure	0.0	0.0	0.0	0.0	32.50
4 Word Meaning	15.75	0.0	25.00	0.0	61.00
5 Comprehension-Text	31.50	0.0	0.0	100.00	191.44
6 Application	59.38	0.0	18.75	238.44	125.19
7 Reading-Related	209.00	107.00	213.44	535.19	616.81
Total	336.37	131.00	257.19	909.62	1337.69

Figure C.5 (cont'd)

Content	No Adult Present Seatwork Large Group	No Adult Present Non-Seatwork Small Group	No Adult Present Non-Seatwork Large Group	Total
1 Decoding	39.81	0.0	0.0	271.94
2 Context Clues	25.44	0.0	0.0	184.81
3 Word Structure	15.63	0.0	0.0	48.13
4 Word Meaning	25.50	0.0	0.0	127.25
5 Comprehension-Text	106.31	20.56	0.0	449.81
6 Application	89.81	66.81	0.0	598.37
7 Reading-Related	120.06	84.69	0.0	1886.19
Total	422.56	172.06	0.0	3566.50

Figure C.6. Class 6, Aggregate Content Areas Sums of Mean Time Allocation (n = 22)

Content	Adult Present Seatwork Small Group	Adult Present Seatwork Large Group	Adult Present Non-Seatwork Small Group	Adult Present Non-Seatwork Large Group	No Adult Present Seatwork Small Group
1 Decoding	0.0	0.0	18.23	65.91	0.0
2 Context Clues	0.0	0.0	26.18	55.00	0.0
3 Word Structure	79.09	119.32	36.73	64.77	0.0
4 Word Meaning	0.0	0.0	24.95	35.18	0.0
5 Comprehension-Text	14.32	60.00	30.50	238.05	7.95
6 Application	99.59	224.68	79.73	439.68	0.0
7 Reading-Related	72.82	201.59	21.59	1009.04	0.0
Total	265.82	605.59	237.91	1907.64	7.95

C-11

Figure C.6. (cont'd)

Content	No Adult Present Seatwork Large Group	No Adult Present Non-Seatwork Small Group	No Adult Present Non-Seatwork Large Group	Total
1 Decoding	0.0	0.0	0.0	84.14
2 Context Clues	0.0	0.0	0.0	81.18
3 Word Structure	0.0	0.0	0.0	299.91
4 Word Meaning	0.0	0.0	42.27	102.41
5 Comprehension-Text	49.55	13.09	25.09	438.54
6 Application	96.14	0.0	98.73	1038.54
7 Reading-Related	63.18	15.91	125.50	1509.64
Total	208.86	29.00	291.59	3554.36

Figure C.7. Class 7, Aggregate Content Areas Sums of Mean Time Allocation (n = 19)

Content	Adult Present Seatwork Small Group	Adult Present Seatwork Large Group	Adult Present Non-Seatwork Small Group	Adult Present Non-Seatwork Large Group	No Adult Present Seatwork Small Group
1 Decoding	4.21	0.0	40.00	0.0	5.26
2 Context Clues	0.0	0.0	12.16	0.0	60.26
3 Word Structute	26.79	0.0	44.26	22.11	6.32
4 Word Meaning	46.47	0.0	43.05	14.21	112.11
5 Comprehension-Text	14.89	127.37	199.32	29.74	74.32
6 Application	48.21	5.26	64.89	18.68	260.37
7 Reading-Related	9.53	127.37	91.42	309.21	321.32
Total	150.11	260.00	495.10	393.95	839.95

Figure C.7. (cont'd)

Content	No Adult Present Seatwork Large Group	No Adult Present Non-Seatwork Small Group	No Adult Present Non-Seatwork Large Group	
1 Decoding	51.32	0.0	0.0	1
2 Context Clues	0.0	13.16	0.0	
3 Word Structure	0.0	0.0	0.0	
4 Word Meaning	4.42	0.0	0.0	2
5 Comprehension-Text	4.42	0.0	0.0	4
6 Application	2.21	0.0	0.0	3
7 Reading-Related	73.42	0.0	0.0	9
Total	135.79	13.16	0.0	22

Figure C.8. Class 8, Aggregate Content Areas Sums of Mean Time Allocation (n= 16)

Content	Adult Present Seatwork Small Group	Adult Present Seatwork Large Group	Adult Present Non-Seatwork Small Group	Adult Present Non-Seatwork Large Group	No Adult Present Seatwork Small Group
1 Decoding	6.50	65.69	0.0	0.0	19.81
2 Context Clues	0.0	80.56	0.0	0.0	0.0
3 Word Structure	9.31	157.19	0.0	0.0	63.88
4 Word Meaning	52.94	127.12	0.0	0.0	79.44
5 Comprehension-Text	16.38	140.44	0.0	0.0	202.69
6 Application	23.81	1178.94	2.50	428.75	57.06
7 Reading-Related	0.0	355.62	0.0	100.00	0.0
Total	109.94	2105.56	2.50	528.75	422.87

C-15

Figure C.8. (cont'd)

Content	No Adult Present Seatwork Large Group	No Adult Present Non-Seatwork Small Group	No Adult Present Non-Seatwork Large Group	Total
1 Decoding	0.0	0.0	0.0	92.00
2 Context Clues	0.0	0.0	0.0	80.5(
3 Word Structure	0.0	0.0	0.0	230.37
4 Word Meaning	0.0	0.0	0.0	259.50
5 Comprehension-Text	85.63	0.0	0.0	445.12
6 Application	156.25	0.0	0.0	1847.31
7 Reading-Related	272.50	0.0	0.0	728.12
Total	514.37	0.0	0.0	3682.98

APPENDIX D

Teacher Rating Forms

Rating of Student Attentiveness

The lesson plan logs tell us how much time was allocated by the teacher to different settings and objectives in reading or mathematics. But there is often a difference between the amount of time taken up by a lesson and the amount of time which is active learning time for a student. We would like to get a more accurate estimate of the amount of actual learning time for an individual student. This will be used as a "correction factor" in the interpretation of the log information.

A student who is paying attention	works actively on assignments participates or listens attentively during class discussion
A student who is not paying attention	talks to his neighbor daydreams draws pictures on his paper falls asleep walks around the room waits for help

Children differ in the amount of time they pay attention in class. Based on your observations of the children so far this year, please rate each child in your class as to the percentage of time that child generally pays attention. Think only of the subject matter for which you are keeping logs. If you are keeping math logs, think about how much of the time a student pays attention during math lessons. If you are keeping reading logs, think of the time you record as reading or reading related.

We suspect that children may differ in attentiveness depending on whether or not an adult is present. For this reason, we would like you to rate each child twice. First rate the children for settings in which an adult is present (either seatwork with an adult supervising or group work with an adult). Then rate the children a second time for settings with no adult present.

One way to go about this task is to go through the following steps:

1. Think of a typical 40 or 50 minute lesson period. Think first of settings where an adult is present to supervise and encourage attention. During what percentage of the time would a student by likely to pay attention to the lesson? On the form labeled "Adult Present," assign each student a rating.
2. Shift your thinking to a 40 or 50 minute period where the students are left to work on their own without an adult. What percentage of the time would a student be likely to pay attention under these conditions? Record your ratings on the form labeled "No Adult."

Use as many or as few of the categories as you wish to indicate the differences in attentiveness among your students. The descriptions below may help as guidelines.

91-100%	The child almost always attends to the learning task.
71-80%	The child sometimes loses time through temporary inattention or general classroom disruption but he tends to work more often than not.
51-60%	The child is as likely to be distracted as he is to work. Only about half the period is spent attending to the task.
21-30%	The child is frequently distracted and inattentive. Large periods of time may be lost through inattention. The child may be noticeably disruptive in class or may simply daydream a lot.
0-10%	The child almost never attends to the learning task.

Teacher's Name_____

Rating of Student Attentiveness

PUT A CHECK IN THE APPROPRIATE BOX

Student	Adult Present 0-10%	11-20%	21-30%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%

Teacher's Name_____

Rating of Student Attentiveness

PUT A CHECK IN THE APPROPRIATE BOX

No Adult

Student	0-10%	11-20%	21-30%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%